

Rhodora

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~~Vegetative Reproduction in *Carex tribuloides*~~
~~and *C. projecta*. *C. A. Weatherby*. 39~~

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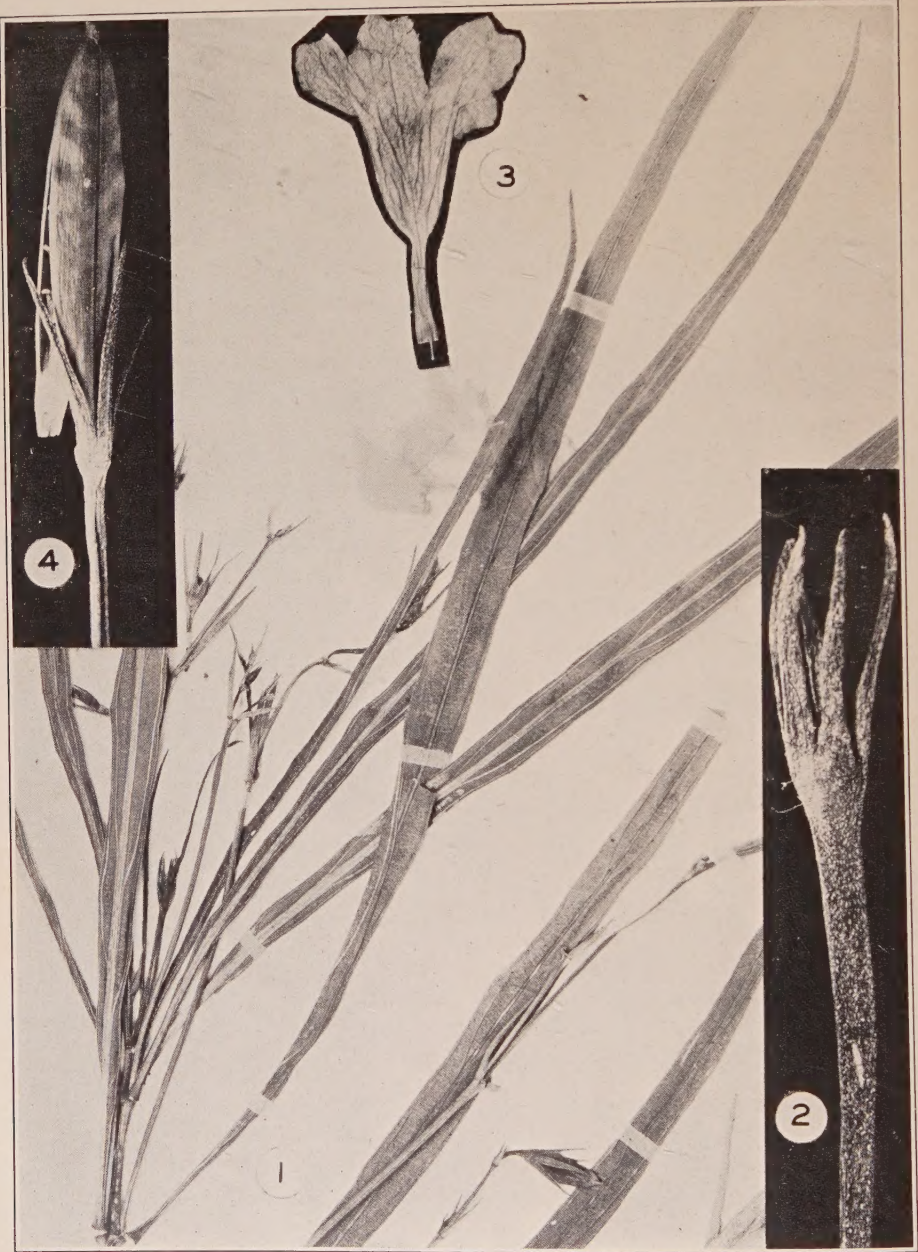


Photo. B. G. Schubert.

RUELLIA BRITTONIANA: FIG. 1, summit of plant, $\times 1$; FIG. 2, summit of peduncle and calyx, $\times 4$; FIG. 3, corolla, $\times 1$; FIG. 4, calyx and capsule, $\times 2$.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD
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RUELLIA IN THE EASTERN UNITED STATES

M. L. FERNALD

(Plates 839–875)¹

ALWAYS a difficult genus to understand, *Ruellia*, as it occurs in the eastern United States, is quite as baffling as elsewhere. Field-experience for several seasons in eastern Virginia has demonstrated to Mr. Bayard Long and me that too often plants growing side-by-side will differ very strikingly in the degree of pubescence or its length on stem or calyx and that, to some extent, the specimens from a single small colony have to be arbitrarily sorted in order that those of a single number may be tolerably uniform. The accumulated collections have been allowed to wait, with the hope that some ambitious student would care to hunt for stable characters. Finally, however, the familiar "let Fernald do it" has prevailed and I have found it necessary to seek fundamental characters in the plants of the "Manual range". In doing so it soon became evident that, since names originally given to plants of Georgia, Carolina, Virginia, Kentucky or Arkansas were being currently used for species growing only far from the type-localities, it would be necessary to consider all species occurring from the Atlantic coast to Nebraska, Kansas and eastern Texas. Happily for me the polymorphic Mexican and Texan series centering about *R.*

¹The cost of reproducing the plates defrayed through a gift from MR. BAYARD LONG.

nudiflora does not extend into the area specially covered, and the relatively simple *R. Drummondiana* and *R. Parryi* are likewise excluded from the present study. I have been concerned only with the species which are definitely eastern or which extend eastward into the "Manual range".

In studying these relatively few species it has become evident that much recent publication upon them has rather glibly passed by the need even to look up the original descriptions of the earlier recognized species. Thus, although *R. humilis* Nutt. was described from "rocks in the upland forests and prairies" of Arkansas, a plant with oblong-ovate and sessile leaves, the name has been transferred by Small and others to a species with rosulate and chiefly spatulate leaves occurring, to quote Small, in "Sandy soil, Coastal Plain, Fla. to Miss. and Ga."; and the latter author says "Stem 1-3 cm. tall" but correctly identifies as *R. humilis*, in his sense, specimens up to ten times that height! Again, *R. hybrida* Pursh came from Savannah, Georgia, but Small restricts it to "Pinelands, Fla." As striking a case as any is *R. parviflora* (Nees) Britton, given by Small the range "Sandy soil, Coastal Plain and adj. provinces, Fla. to Tex., Ind. and N. J."; the case striking because *Dipteracanthus ciliosus*, γ. *parviflorus* Nees, basis of Britton's binomial, came from far away from the Coastal Plain, "Ad Ky. fluvium, Julio (Short! in herb. Hook.)". Incidentally, Nees described it with petioles 3-6 inches long—"corollâ vix pollicari, foliis paulo longiori petiolo (3-6-pollicari)." Such a description can hardly apply to a plant with petioles rarely 1.5 cm. long! Nevertheless the misbegotten name, *R. parviflora* (Nees) Britton, promptly came into vogue for almost anything, with either petioled or sessile leaves and no matter where it grew, until Blake revived *R. caroliniensis* (Walt.) Steud., which was based in a roundabout way upon Walter's clear description of a characteristic Carolina plant. When *R. caroliniensis* came to the front it replaced *R. parviflora* as a blanket-name for anything, just as, still earlier, the name *R. strepens* L. had covered almost every species in the United States.

The greatest complexity is in the two series of variations which together make up the northernmost or, at least, the most northern-ranging species, *R. humilis* and *R. caroliniensis*, for a number

of strictly southern species are relatively stable. The latter series of plants, relatively comforting to work with, includes *R. pedunculata* Torr., a clear-cut species radiating from the Ozarkian region southward into Louisiana and eastern Texas; two habitually similar but morphologically distinct new species, one of pine barrens of the Coastal Plain from South Carolina (possibly Virginia) to Louisiana, the other centering on the Blue Ridge and Alleghenies; another newly described species concentrated in southern Florida; *R. ciliosa* Pursh (as I interpret him), the characteristic rosulate-leaved plant of central Florida, north to South Carolina and west to Louisiana, the species treated erroneously by Small as *R. humilis* Nutt.; the fleshy plant of subtropical Florida, *R. succulenta* Small; and the local and amazingly clear long-flowered and large-fruited *R. noctiflora* (Nees) Gray, occurring from eastern Georgia to northwestern Florida, thence to southern Louisiana. There is no trouble in separating these relatively stable species nor in promptly recognizing the continental *R. strepens*.

The great difficulty is to find stable characters within the two polymorphous species, *R. caroliniensis* and *R. humilis*. The latter, characterized by somewhat uniform sessile or essentially sessile leaves, many flowering nodes and a strong tendency to bushy branching, is found through much of the prairie region, but in some of its variations it extends eastward to the Blue Ridge and in one variety even to northwestern Florida. In some areas the corolla may be only 2 cm. long, in others up to 8 cm. Whether the corolla is short or long the leaf-outlines present two parallel trends, on the one hand elliptic-oblong to oblong-lanceolate and (the larger ones) only 1–2.5 cm. broad, on the other hand ovate, oval-oblong or elliptic and 2–4 cm. broad. Furthermore, the pubescence varies from a copious wide-spreading hirsuteness to glabrescence (the latter especially on the Cumberland Plateau). Search at long and baffling periods through eight months have failed to bring to light any stable characters. The series is certainly an unstable one. I have, as the best I can yet do, suggested its recognition as a number of more or less segregated geographic varieties with some minor forms.

Similarly with *R. caroliniensis*, trials of first one character,

then another, from June to February, have led to optimistic moments, these always followed by despair. At one time the reactions of the seeds in the diverse trends within the mass of material looked like a hopeful character. In *Ruellia* (at least in all of ours) the thin and discoid seeds are superficially very similar. When soaked for a few seconds in water they give an immediate reaction. They promptly send out from the margin a continuous film of mucilage and the flat surfaces become covered with minute processes. When watched for a minute or two they broaden the marginal band of mucilage and the minute processes prolong as flexuous mucilage-spiracles, these visibly shooting out (as seen by a microscope) and often suggesting slender flames. Eventually (after many minutes) the whole surface is plush-like and the marginal band breaks up (on drying) into innumerable slender spiracles; and finally the spiracles somewhat collapse, fall together as domes and eventually subside. During a full week of soaking and watching the behavior of seeds, with thousands of objects to study, I had great hopes that the different species and varieties would yield in the behavior of moistened seeds something diagnostic. When, however, the whole series was compared I was forced to give up; the possibility that, in spite of its history and development, taxonomy, through *Ruellia*, was entering the field of experimental physiology, was discouragingly abandoned. I have, then, as the best I can do, treated the polymorphous *Ruellia caroliniensis* as a series of geographic varieties, some with pretty definite areas of development, others overlapping, and within these varieties, minor local forms in which the abundance, scarcity or length of pubescence strikingly differ.

In this unusually protracted study, in view of the small number of species involved, I have had not only the accumulated material of the Gray Herbarium but that of several of the larger herbaria and of a number of smaller ones, to the officers or owners of which I extend my cordial thanks for the use of their material. Throughout the work, both in bibliographic details and in making the plates I have had the unlimited and most valuable aid of Dr. BERNICE G. SCHUBERT. Even if the keys and descriptions fail to convey my ideas of a still perplexing group her photographs will make quite clear the chief diagnostic characters.

In the citations, specimens which are in the Gray Herbarium are rarely designated as being there, then by G. The other herbaria cited are as follows:

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As I understand these species they are as follows.

KEY TO RUELLIA IN THE EASTERN UNITED STATES

- a. Main axis terminating in a prolonged flowerless leafy tip, with flowers 1-few at leafy-bracted summits of branches or on peduncles from the median or lower axils, or the cymose inflorescence much branched. . . . b.
 - b. Leaves chiefly elongate-linear; bracts of loose cyme linear or linear-lanceolate; garden-escape in the Gulf States.
 1. *R. Brittoniana*.
 - b. Leaves lanceolate, oblong, elliptic or ovate; peduncles terminated by dilated bracts; indigenous. . . . c.
 - c. Calyx-segments lanceolate to lance-linear, flat to the tip, 2-4 mm. broad; ovary and capsule glabrous; larger leaves with blades 7-18 cm. long and 3-9 cm. broad. . . . 2. *R. strepens*.
 - c. Calyx-segments narrowly linear, tapering to prolonged linear-acicular tips, the segments 0.5-1.2 mm. wide at base; larger leaf-blades 2-11 cm. long and 0.8-5 cm. broad. . . . d.
 - d. Stem usually divergently branching, the branches simple or forking, or stem simple to but slightly branched; peduncles or glomerules from axils of main stem or branches; calyx-segments 0.5-1 mm. wide, tapering from base to very slender tips.
 - Calyx, ovary and capsule pilose with slender-tipped but short spreading pubescence; plant of Ozarkian and adjacent areas. . . . 3. *R. pedunculata*.
 - Calyx closely covered with appressed and partially immersed slender cystoliths; ovary and capsule glabrous; plant of southeastern Coastal Plain. . . . 4. *R. pinetorum*.
 - d. Stem simple or with few ascending branches; peduncles 1-flowered, from 1 or 2(-4) nodes; calyx-segments linear, 0.7-1.2 mm. wide to near middle, tapering thence to apex, minutely canescent-pilose; capsule pilose-hirtellous; Appalachian and eastern Piedmont species. . . . 5. *R. Purshiana*.

- a. Main axis with sessile or very short-peduncled glomerules or flowers in the axils of the upper (sometimes median and lower) leaves, or the terminal pairs of leaves crowded and approximate to the upper fertile axils. . . . e.
- e. Calyx-segments flat, lanceolate, 2-4 mm. wide, shorter than to but slightly exceeding capsule; flowers chiefly or wholly cleistogamous, with small closed corollas; wide-ranging erect simple or but slightly erect-branching continental plant. 2a. *R. strepens*, forma *cleistantha*.
- e. Calyx-segments narrowly linear, with prolonged and slender to almost bristleform tips mostly overtopping the capsules; flowers rarely cleistogamous (except in nos. 5a and 6), mostly showy and expanding. . . . f.
- f. Plant strongly dimorphic or heteromorphic; the vernal (sometimes later) stems erect and simple or slightly branched, with 1-3 showy flowers from axils of 1-3 pairs of upper leaves; later trailing or decumbent branches prolonged and bearing dense glomerules of mostly closed tubular cleistogamous flowers and abundant glabrous capsules; leaves elliptic, oblong, oblanceolate or narrowly obovate, 1.5-5.5 cm. long, definitely short-petioled, firm, with one or both faces often closely covered with slender cystoliths; expanded corolla 2.5-6 cm. long; calyx 1.5-2.5 cm. long; plant of Florida. 6. *R. heteromorpha*.
- f. Plant not strongly or not at all dimorphic; flowers all or nearly all with expanded corollas or, if most or all flowers cleistogamous (in no. 5a), the plant erect and simple or nearly so and the capsules pilose-hirtellous. . . . g.
- g. Principal leaves spatulate-oblong or spatulate-obovate, with prolonged bases and rounded or blunt tips; stem very short and with the crowded basal leaves subrosulate, or stem elongate and erect, with the 2-5 pairs of spatulate leaves remote, these 0.3-3 cm. broad; veins of leaves and usually the uppermost internodes white-villous; species of southern Coastal Plain. 7. *R. ciliosa*.
- g. Principal leaves ovate, lanceolate, elliptic or oblong, not appearing rosulate (if slightly subspatulate and round-tipped in no. 8, then with only minutely pilose to glabrescent fleshy stems). . . . h.
- h. Stem fleshy, often hollow, glabrescent, erect, simple or with strongly ascending branches; leaves fleshy, purple-tinged, oblanceolate, narrowly obovate or oblong, essentially glabrous; calyx shorter than to one third longer than the glabrous capsule; plant of Everglades region of southern Florida. . . . 8. *R. succulenta*.
- h. Stem not fleshy, solid, firm, pubescent to rarely glabrous; leaves membranaceous to firm, not fleshy, rarely purplish, linear-lanceolate to broadly lanceolate, oblong, elliptic or ovate, pubescent to glabrate or glabrous; calyx exceeding capsule. . . . i.
- i. Leaves sessile or barely petioled but often with narrowed bases, nearly uniform or the upper but slightly reduced, erect or ascending.
Simple or with erect branches (divergently branched only after injury); primary axis with 3-10 remote pairs of narrowly lanceolate to lance- or elliptic-oblong submembrana-



Photo. B. G. Schubert.

RUELLIA TWEEDIANA: FIGS. 1 and 2, portions of branching plant, $\times 1$; FIG. 3, summit of peduncle and base of calyx, $\times 4$; FIG. 4, tip of calyx-segment, $\times 10$; FIG. 5, corolla, $\times 1$.



Photo. B. G. Schubert.

RUELLIA STREPENS: FIG. 1, flowering median node, $\times 1$; FIG. 2, corolla, with one basal bract removed, $\times 1$; FIG. 3, flower, showing broad calyx-segment, $\times 1$; FIG. 4, long-peduncled fruit, $\times 1$.

- ceous puberulent or minutely hirtellous leaves tapering to apex; flowers 1-few from 1-4 upper nodes; calyx 2.5-4.5 cm. long, cinereous-puberulent or minutely hispidulous; corolla 6-11 cm. long, its slender tube 4.5-8 cm. long; capsule cinereous-puberulent, 2.25-3.5 cm. long; species of southern Coastal Plain. . . . 9. *R. noctiflora*.
- Branching, rarely simple, the elongate arched-ascending to widely divergent branches often reclining at base, decumbent or with bushy habit; leaves narrowly oblong-lanceolate to broadly oval or ovate, coriaceous, with blunt or rounded tips, often hirsute to coarsely villous, 4-12 pairs on well developed primary axis equaling or longer than internodes, 4-10 nodes floriferous; calyx 1.5-2.5 cm. long, usually hirsute to villous-ciliate; corolla 2-8 cm. long, its tube 0.7-5 cm. long; capsule glabrous, 1.2-1.5 cm. long; plant of Great Plains, eastward to Blue Ridge and, rarely, northwestern Florida. 10. *R. humilis*.
- i. Leaves, or at least the principal ones, tapering to definite petioles (up to 2 cm. long), spreading to ascending; primary axis with 1-4 flowering nodes or, if more, with leaves often undulate-dentate.
- Upper internodes greatly abbreviated, villous, hirsute, puberulent or glabrescent; upper pairs of leaves approximate or crowded; corolla usually showy and expanding, the flowers only exceptionally cleistogamous; calyx-segments linear-setaceous, attenuate from near the base; capsules glabrous (or, if pilose, the plant with copiously villous upper internodes, leaves and calyces). 11. *R. caroliniensis*.
- Upper internodes elongate, minutely pilose-puberulent; upper pairs of leaves distant; corolla usually clavate, inconspicuous, unexpanding, the flowers cleistogamous; calyx-segments linear up to the middle, tapering above; capsules pilose-strigose
- 5a. *R. Purshiana*, forma *claustriflora*.

1. RUELLIA BRITTONIANA Leonard, emended and validated.¹ Stems usually several, subligneous, 3-10 dm. high, subterete, nearly or quite glabrous, soon branching, subcorymbosely

¹ Validated by the following Latin diagnosis:

RUELLIA *Brittoniana* Leonard, caulibus subligneis adscendentibus 3-10 dm. altis, deinde ramosis supra subcorymbosis; foliis plerumque lineari-lanceolatis utrinque valde attenuatis petiolatis, subtus lineolatis supra glabris, majoribus 0.8-2.8 dm. longis 0.5-2 cm. latis integris vel obscure undulatis; inflorescentiis subcorymbiformibus foliosis pedunculis rigide adscendentibus quam foliis subtendentibus 1/3-1/2 brevioribus; bracteis bracteolisque lineari- vel anguste lanceolato-subulatis; calycis segmentis subrigidis anguste lanceolatis attenuatis ad apicem obtusum glabris vel sparsissime hirtellis supra cystolithos gerentibus, segmentis maturis 5-10 mm. longis; corollis 2.5-4 cm. longis fauce infundibuliforme extus glabro vel sparse piloso supra 0.9-1.5 cm. lato, limbo (expanso) 2.5-5 cm. lato; capsulis lanceolato-fusiformibus glabris 2-2.7 cm. longis, retinaculis 14-24; seminibus suborbicularibus 2-2.5 mm. diametro.

branched at flowering summit: lowest leaves linear-oblong to -spatulate; principal and rameal leaves narrowly linear-lanceolate or linear, long-attenuate to callous apex and to ascending petiole, pale green, glabrous above, often lineolate beneath, the larger (primary) ones 0.8–2.8 dm. long and 0.5–2 cm. broad, entire or obscurely undulate: inflorescence corymbiform, leafy, often equaled or exceeded by upper leaves, the stiffly ascending peduncles one third to half as long as the subtending leaves and cymosely forking: bracts and bractlets linear- to narrowly lance-subulate: calyx-segments subrigid, narrowly lance-attenuate to obtuse tips, glabrous, glabrescent or barely hirtellous, usually covered with pale cystoliths; the mature segments becoming 5–10 mm. long: corolla blue-violet, 2.5–4 cm. long; cylindric tube 8–13 mm. long; the broadly infundibuliform throat glabrous to but sparsely pilose without, 1.2–2 cm. long, 0.9–1.5 cm. broad at summit; limb (laid open) 2.5–5 cm. broad, with broad rounded lobes; capsule lance-fusiform, glabrous, 2–2.7 cm. long; retinacula 14–24; seeds suborbicular, 2–2.5 mm. in diameter.—Journ. Wash. Acad. Sci. xxxi. 96, fig. 1 (1941) without diagnosis but accepted and here validated as to type, *Cryphiacanthus angustifolius* Nees in DC. Prodr. xi. 199 (1847) in part (the Galeotti specimen from Jalapa); not *R. angustifolia* Swartz, Prodr. Veg. Ind. Occ. 93 (1788). *R. spectabilis* Britton in Ann. N. Y. Acad. Sci. vii. 192 (1893), without diagnosis, only as the Mexican plant was included in his citation of the type, *Cryph. angustifolius* Nees, l. c. but not as to Paraguayan plant cited; not *R. spectabilis* Nicholson, Gard. Diet. iii. 334 (1886). *R. malacosperma* sensu Small, Man. Se. Fl. 1229 (1933), not Greenman in Proc. Am. Acad. xxxiv. 572 (1909).—Native of eastern Mexico; cultivated and spread to disturbed soils, roadsides, cultivated ground, borders of ditches, etc., from Texas to Florida. FLORIDA: open places, Arcadia, 1918, *Small*, no. 9010 (NY) as *R. malacosperma*; Glen St. Mary, June, 1923, *C. R. Stevens* (Mo); roadsides, Ft. Myers, Aug., 1921, *W. M. Buswell* (NY) as *R. malacosperma*. LOUISIANA: low sandy soil, Houma, Aug. 31, 1913, *E. C. Wurzlow* (Mo and US) as *R. spectabilis*, Oct. 10, 1913, *Wurzlow* (NY), identified by *Small* as *R. malacosperma*, by *Leonard* as *R. Tweediana* Griseb. TEXAS: escaped from gardens, San Antonio, Sept. 20, 1901, *Bush*, no. 864 (Mo); damp places near Polytechnic, Oct. 10, 1916, *A. R. Drumm* (US) as *R. spectabilis*; Houston, July 10, 1934, *Cory*, no. 11,330, as *R. Tweediana*. SAN LUIS POTOSI: wet ledges by river, Micos, July 31, 1891, *Pringle*, no. 5043, as *R. Tweediana*; gravelly and rocky sand near river, alt. 200 feet, near Axtla, June 27, 1942, *J. N. Weaver*, no. 658, as *R. Tweediana*, corrected to *R. Brittoniana*. VERA CRUZ: in the bed of the Coloboza near Tantoyuca, April, May, 1858, *Ervendberg*, no. 104, identified by *Asa Gray* as *Cryphiacanthus angustifolius*, by *Leonard* as *R.*

Tweediana; along streams, Tenera, Zacuapan, Dec., 1912, *Purpus*, no. 6162, identified by Leonard as *R. Tweediana*; Barranca de Panoya, Sept., 1919, *Purpus*, no. 8409, identified by Leonard as *R. Tweediana*. GUATEMALA: cultivated, vicinity of Quiriguá, Dept. Izabel, *Standley*, no. 24,307, as *R. malacosperma*, another number (72,225) cited by Leonard as *R. Brittoniana* in publishing that unclarified name. N. B. The Mexican material in the Gray Herbarium only here cited. PLATE 839.

So far as I can find the specific characters of *Ruellia Brittoniana* have never been clearly stated, except partially by Nees who, under the name *Cryphiacanthus angustifolius*, had two quite distinct but by him undifferentiated species, and partially by Small, who described and had before him *R. Brittoniana* but misidentified it as *R. malacosperma*. In fact, the entire history of the names and the recognition of specific lines in the two plants, inadequately treated by Nees in 1847 as a geographically bi-centric species, *Cryph. angustifolius*, is one of discreditably opportunist shiftings, without any evident attempt at clarification. The original treatment of the two confused species by Nees in DC. Prodr. xi. 199 (1847) was

5. C. ANGUSTIFOLIUS, caulescens, foliis lanceolato-linearibus acutis integerrimis sessilibus glabris, pedunculo subbifloro folio brevior, calycis laciniis subulatis scabris. 2♂ Ad Xalapa (Galeotti! in h. Hook.), Entre Rios (Tweedie!). Corolla pollicaris. Capsula 9 lin. longa, lanceolata, 16–20-sperma. (v. in h. Hook.)

The first separation of the Mexican (Xalapa or Jalapa, *Galeotti*) plant and the Argentinian (*Tweedie*) elements was in 1879 when Grisebach, in his *Symbolae ad Floram argentinam*, in die Abhandlungen Königlichen Gesellschaft der Wissenschaften zu Göttingen, xxiv. 259 (1879), took out the Argentinian element, as *Ruellia Tweediana* Griseb.:

1597. *R. Tweediana* Gr.—Syn. *Cryphiacanthus angustifolius* Tweedius Ns. Folia variant lineari-lanceolata et inferiora breviora lanceolata v. ovato-lanceolata.—E [i. e. Prov. Entrerios, as explained by Grisebach on his p. 4, Nees having originally cited "Entre Rios"].

In other words, Grisebach, concerned only with the flora of Argentina and not the *Galeotti* specimen from Xalapa (or Jalapa) in the state of Vera Cruz, Mexico, based his *Ruellia Tweediana* (without adequate description) on the *Tweedie* specimen cited by Nees. Since Grisebach did not use trinomials but regularly designated varieties as "var." (see the synonym of *R. geminiflora*

Kunth given by him on the same page as "*R. geminiflora* var. *humilis* Gr.") it may reasonably be inferred that his typonym of *R. Tweediana* "Syn. *Cryphiacanthus angustifolius* Tweedianus Ns." was intended to mean the Tweedie element of *C. angustifolius*, Grisebach thus leaving out the Galeotti plant, which, by the very sensible but commonly ridiculed "doctrine of residues" remained as true *C. angustifolius*. If it be argued otherwise the result is somewhat the same, for there was already a *Ruellia angustifolia* Swartz (1788), so that *R. Tweediana* is the first valid name under *Ruellia*. Hemsley, in his monumental *Biologia Centrali-Americana* (Botany), ii. 508 (1882), seems to have suspected that the Jalapa (Mexican) plant was not identical with the Argentinian element, for he entered

Ruellia tweediana, Griseb. Symb. ad Fl. Arg. p. 259?

Cryphiacanthus angustifolius, Nees in DC. Prodr. xi. p. 199, saltem pro parte.

SOUTH MEXICO, Jalapa (*Galeotti*). Hb. Kew.

The Argentine plant may be a different species.

But Hemsley did not note any specific differences. Neither have those who have rather easily and very carelessly rushed into print with substitute-names. Thus, when, in 1893, in an enumeration of plants of Paraguay, Britton substituted for *Cryphiacanthus angustifolius* Nees the name *Ruellia spectabilis*, he obviously intended the plant of temperate eastern South America, not the Mexican element, but Britton's item was so hastily prepared that it is evident that he did not stop to gain a clear understanding of specific lines, nor had he gone carefully into the literature. His treatment was as follows:

Ruellia spectabilis, Britton.

Cryphiacanthus angustifolius, Nees in D.C. Prod., xi, 199, not

Ruellia angustifolia, Sw.

Caballero (461). January.

This species has branching stems 10-12 cm. high, linear, sessile leaves, and flowers larger than in no. 323 [*Ruellia Morongii* Britt., new name for *Cryphiacanthus acaulis* Nees, not *R. acaulis* R. Br.], otherwise much the same. Occurs on the railway track.

Since *Cryphiacanthus angustifolius* (in its inclusive sense) consists of erect, caulescent plants up to 1 m. high, with remote pairs of linear-lanceolate to broadly lanceolate leaves and glabrescent to only minutely glandular-hirtellous calyx about half the length of the capsule or shorter, while *Cryphiacanthus*

acaulis Nees, basis of *Ruellia Morongii*, is, as described by Nees and partly by Britton and as shown by all specimens, acaulescent, "Habitus *Primulae*" (Nees), with the basal rosulate leaves oblong-ovate, -obovate or subspatulate, and the calyces copiously villous-hirsute and equaling to exceeding the capsule, Britton's characterization of the two as "much the same" indicates a rather offhand understanding of a few conspicuously different species. Dr. Britton also overlooked the fact that, in his well known Dictionary of Gardening, iii. 334 (1886), George Nicholson had published a *R. spectabilis* (Hook.) Nicholson, based on *Dipteracanthus spectabilis* Hook. Bot. Mag. t. 4494 (1850), an Andean plant of a different section, with flowers sessile in the axils of ovate leaves, etc. Furthermore, Britton evidently overlooked *R. Tweediana* Griseb. (1879), the name he should have taken up for the Paraguayan as well as Argentinian *Cryphiacanthus angustifolius*. Had he looked up Grisebach's Symbolae he would not, on the same page with his *R. spectabilis*, have published as new *R. Tweedyi* (Nees) T. Anderson in Herb. Kew., based on *Blechnum Tweedyi* Nees, for, by the rules promulgated and followed by Britton, the substantive-genitive personal names (such as *Tweedyi*) and the adjectival forms (such as *Tweediana*) could not both be used. By the International Rules, vigorously fought by Britton, his combination *R. Tweedyi* (Nees) T. Anderson ex Britton is rescued. Whether the type of *R. Tweedyi* is a *Ruellia* is much more doubtful. The genus *Blechnum* is so very different from *Ruellia* that it would be surprising if Nees, who monographed both genera, did not know it. Incidentally, but of real importance, the original *Blechnum Tweedyi* came from Panama. It would be very surprising, to say the least, if the same species (even if not a *Blechnum*, a genus apparently unknown in Paraguay) were found also in Paraguay.

The next step in the tortuous history of the much abused typonym, *Cryphiacanthus angustifolius* Nees, was when Leonard, noting that Britton had slipped in publishing a second *Ruellia spectabilis*, gave, in Journ. Wash. Acad. Sci. xxxi. 96, fig. 1 (1941), another name:

***Ruellia brittoniana* Leonard, nom. nov.**

Fig. 1

Cryphiacanthus angustifolius Nees in DC. Prodr. 11: 199. 1847.

Not *R. angustifolia* Sw., 1788.

Ruellia spectabilis Britton, Ann. New York Acad. 7: 192. 1893; not Nichols, 1886.

A single cultivated plant, from Guatemala, was cited and a very characteristic figure of the Mexican plant, with long-attenuate upper leaves inclined to overtop the subcorymbiform inflorescence, was given as fig. 1. Leonard gave no statement of characters nor any indication as to whether he was accepting *Cryphiacanthus angustifolius* in the original inclusive sense of Nees or whether he restricted it to the Mexican element left to stand for it when Grisebach withdrew the Argentinian element as *Ruellia Tweediana*. It is unfortunate, if he intended *R. Brittoniana* (Britton having published only on the Paraguayan plant) to stand exclusively for the quite different North American species, that he did not give any word of clarification, for the North American species, at least in the Gray Herbarium and the Britton Herbarium, had been annotated by Leonard as *R. Tweediana*. Incidentally, had he looked up the first publication of *R. spectabilis* he would have found that its author was Nicholson, not "Nichols". Only by accepting the possible and perhaps probable interpretation that, by removing the Tweedie element from the mixed originals of Nees as *R. Tweediana*, Grisebach had, by the "doctrine of residues", left the Mexican element as true *Cryph. angustifolius*—only by this interpretation can we possibly save for the Mexican plant the inappropriate name *R. Brittoniana*, which may or may not have been intended for it. I am following this interpretation merely in order to avoid publishing still another name and thus further increasing the confusion. If the alternative reasoning were adopted the Mexican species (cultivated and naturalized eastward to Florida) would require a new and clearly applied name, since none of the authors, from Grisebach on, who have hastily proposed new names in this relatively simple pair of species, has recognized the elementary requirement of sound taxonomy, of accurately defining their species and explaining what they meant.

I have stated above what I consider the specific characters of *Ruellia Brittoniana* as here validated, and in PLATE 839 its diagnostic characters are shown. In PLATE 840 I have shown some of the differential characters of *R. Tweediana*; and in the following paragraph I indicate some of its other claims to recognition as an endemic species of temperate eastern South America, the name *R. Tweediana* thus being validated:

R. TWEEDIANA Grisebach, caulibus glabris; foliis inferioribus lanceolatis vel lanceolato-ovatis, supernis lanceolatis subacutis vel obtusis juvenilibus ciliolatis, majoribus 5–12 cm. longis integris vel undulatis; inflorescentiis elongatis subthyrsoideis; calycibus glanduloso-hirtellis, segmentis lineari-subulatis attenuatis ad apicem acutum hirtum; corollis 3–4 cm. longis extus valde pilosis, fauce supra 5–10 mm. lato; capsulis lanceolato-fusiformibus 2–2.5 cm. longis glabris. TAB. 840.

Since *Ruellia Brittoniana* has been mistaken by Small and his followers for *R. malacosperma* Greenm. it should be noted that the latter species differs in the following characters: young internodes of stem and young leaves villous-hirsute, becoming glabrate; leaves oblong or elliptic-lanceolate, often undulate-dentate, the primary ones slender-petioled, strigillose-lineolate; calyx lineolate, with lance-attenuate sharp-pointed segments becoming 1.5–2 cm. long; corolla 3.5–5 cm. long, essentially glabrous without; capsule 2.5–3 cm. long; seeds orbicular, broadly obovate or elliptic, 2.8–3.3 mm. long. The plant called *R. malacosperma* by Small (as represented in the Britton Herbarium) is not that species; all that I have seen of it belongs to the frequently cultivated *R. Brittoniana*.

2. *R. STREPENS* L., as emended by L. in 1771. Stems 1–few from a knotty rhizome, 0.2–1.1 m. high, simple or with few ascending branches, obtusely 4-angled, minutely pilose (often in decussate lines), glabrate or glabrous (rarely, when deeply buried in silts after freshets, the stem becoming strongly ligneous and then freely branching); lowest leaves small, rounded or obovate; principal leaves membranaceous, ovate, rounded or tapering to short but definite petioles, more or less acuminate, entire or barely undulate, the larger ones 7–18 cm. long and 3–9 cm. broad, short-strigillose on one or both surfaces or glabrescent, minutely ciliolate when young; short to long ascending peduncles (0.2–10 cm. long) borne from axils of 1–3 pairs of median leaves (very rarely terminal), these bearing a pair of dilated leafy bracts and usually 1–3 showy expanded flowers: calyx-segments lanceolate to lance-linear, flat to tip, 2–4 mm. broad, 1–2.5 cm. long, villous-ciliate, more or less villous or pilose to glabrescent on the back: corolla pale blue-violet, broadly expanding, 3–6 cm. long; the slender tube about as long as the broadly funnelform throat, the broad lobes rounded: capsule (relatively infrequent as compared with the next form) 1–2 cm. long, glabrous, usually overtopped by calyx-segments.—Sp. Pl. 634 (1753) in part, as emended by L. Mantiss. Alt. 422 (1771), he thus excluding the wholly different plants of Dillenius and others; Schkuhr, Handb. ii. t.

clxxii. (1791); Willd. Sp. iii. 363 (1800); Pursh, Fl. Am. Sept. ii. 420 (1814); LeConte in Ann. Lye. N. Y. i. 140 (1824); and later authors generally. *Dipteracanthus strepens* (L.) Nees in Linnaea, xvi. 292 (1842) and in DC. Prodr. xi. 121 (1847), including var. *calycinus* Nees, l. c. (1847), var. *pedunculatus* Nees, l. c. 122 (1847) and var. *strictus* (Nees) Nees, l. c. (1847), in part. *D. strictus* Nees in Linnaea, xvi. 293 (1842). *R. biflora* Balbis ex Nees in DC. Prodr. xi. 122 (1847) in synonymy, nomen only. *R. foliosa* Schweinitz ex Nees l. c. in synonymy, nomen only. *R. oblongifolia* Kinn ex Nees, l. c. in synonymy, nomen only. *R. vincaeiflora* DC. ex Nees, l. c. in synonymy, nomen only.—Low woods, bottomlands, wooded swamps, etc., chiefly in basic or calcareous soils, South Carolina to eastern Texas, northeast and north to north-central New Jersey, southern Pennsylvania, central Ohio, Indiana, Illinois, southern Iowa and eastern Kansas. Fl. mid-May–July (rarely –October). The following, from a very much larger series, are characteristic. NEW JERSEY: New Brunswick, “common” June, 1894, *F. H. Blodgett* (NY). PENNSYLVANIA: LANCASTER CO.: rich wooded hillside along Conestoga Creek, 1 mile south of Bausman, *Louise F. A. Tanger*, no. 3270 (Pa, Phil); banks of Conestoga, near Lancaster, 1838, *W. W. Wister* (Phil), June 17, 1859, Porter; near Columbia, *S. W. Knipe* (Phil); “on an excursion to Safe Harbor”, June 18, 1859, *Joseph Crawford* (Phil). CUMBERLAND CO.: creek-bankside, Camp Hill Borough, *H. L. Plasterer*, as D. E. and Dorothy Wade, no. 1727 (Pa). FRANKLIN CO.: Mercersburg, June, 1844, *Porter* (Phil). DELAWARE: without statement of locality, *Nuttall* (Phil). MARYLAND: CECIL CO.: Bald Friar, July 4, 1907, *E. B. Bartram* (Phil). MONTGOMERY CO.: banks of Potomac, June 6, 1881, *J. D. Smith*; Great Falls, *C. S. Williamson*; High Island, June 6, 1881, *C. S. Sheldon* (US). DISTRICT OF COLUMBIA: Potomac Flats, Chain Bridge, June 13, 1897, *Kearney* (NY); Canal District, June 9, 1897, *Steele* (US). WEST VIRGINIA: JEFFERSON CO.: along Shenandoah River, near Charlestown, *R. F. Martin*, no. 200 (USNA). CABELL CO.: dry hillside, Huntington, *Gilbert*, no. 123 (Mo, Pa). WAYNE CO.: Buffalo Creek, *Plymale*, no. 445. VIRGINIA: ISLE OF WIGHT CO.: base of rich calcareous wooded slopes by Burwell’s Bay, James River, below Rushmere (Ferguson’s Wharf), *Fernald & Long*, no. 13,463. PRINCE GEORGE CO.: swampy woods, bottomland of Powell’s Creek, Garysville, *Fernald & Long*, nos. 8472 and 8854. CLARKE CO.: Castleman Ferry, June 13, 1937, *O. M. Freeman* (USNA). FREDERICK CO.: low woods, Cedar Creek, Meadow Mills, *Hunnewell*, no. 13,712. SHENANDOAH CO.: along stream, north of Short Mt., *Allard*, no. 5087. PAGE CO.: shady ravine, eastern foothills of Massanutten Mountain, *W. H. Camp*, no. 1386 (NY). ROANOKE CO.: Roanoke River, south of Roanoke, *Small & Heller*, no. 431 (Phil). MONT-



Photo. B. G. Schubert.

RUELLIA STREPENS, forma *CLEISTANTHA*: FIG. 1, summit of plant, $\times \frac{2}{5}$; FIG. 2, terminal glomerule, $\times 1$; FIG. 3, node with large cleistogamous flower, $\times 2$; FIG. 4, terminal glomerule with two small cleistogamous flowers, $\times 2$; FIG. 5, subterminal fruiting node, $\times 2$; FIG. 6, calyx and open capsule, $\times 2$.



Photo. B. G. Schubert.

RUELLIA PEDUNCULATA: FIG. 1, small flowering plant, $\times 4/9$; FIG. 2, base of more branching fruiting plant, $\times 1/2$; FIG. 3, portion of branching inflorescence, $\times 1$; FIG. 4, calyx and capsule, $\times 2$; FIG. 5, calyx-segments and base of capsule, $\times 10$; FIG. 6, strigose surface of capsule, $\times 10$.

GOMERY co.: limestone soil, edge of woodlands just north of Price's Station, *A. B. Massey*, no. 5065. SOUTH CAROLINA: BERKELEY co.: Eutaw Springs, May, *H. W. Ravenel*. ATHENS co.: Aiken, Sept. 17, 1885, *H. W. Ravenel*. GEORGIA: without stated locality: "of the Savannahs", *Le Conte* (Phil); "Mts. of Georgia", *Chapman* (US). WALKER co.: dry ground, Chickamauga Park, May 25, 1911, *J. R. Churchill*. (Specimens from Polk County, Florida, Mrs. *J. M. Milligan* (US) were presumably of cultivated plants. *Chapman* includes "Florida" in his stated range, but his "*R. strepens*" was made up of several other species. There is no material from Florida in the Britton Herbarium, rich in specimens from that state.) OHIO: ATHENS co.: Athens, *J. P. Drushel*, no. 6623 (Mo). LAWRENCE co.: open woodlands, Coal Grove, *Biltmore Herb.*, no. 4500^b (US). FRANKLIN co.: Columbus, *Sullivant*. MONTGOMERY co.: Dayton, July 7, 1879, *L. V. Morgan* (US). BUTLER co.: moist woods, Oxford, June 30, 1910, *Overholts* (Mo). HAMILTON co.: near Cincinnati, June 15, 1879, *C. G. Lloyd* (NY, US); open woods on hillsides, Anderson's Ferry, June 14, 1905, *E. L. Braun* (Braun). (Specimens with the label "Plants of Northern Ohio", and marked as from Lucas County, bear the memorandum "Obtained from Mr. Burger of Toledo; never found it in northern Ohio".) INDIANA: WELLS co.: moist banks of Wabash River, June 21, 1905, *Deam* (US). MONTGOMERY co.: Crawfordsville, June 23, 1892, *Rose* (US). MARION co.: woods along White River, *Scott McCoy*, no. 1938 (US). PARKE co.: Turkey Run, *W. H. Duncan*, no. 114 (Duke). VIGO co.: Terre Haute, June 1, 1889, *B. W. Evermann* (US). BARTHOLOMEW co.: creek-bottom north of Elizabethtown, *Deam*, no. 34,266. JEFFERSON co.: Hanover, 1874, *Coulter* (Phil). KENTUCKY: SCOTT co.: along Elkhorn Creek, Stamping Ground, *J. W. Singer*, no. 219 (US). FRANKLIN co.: open woods, Farmdale, June 16, 1879, *H. R. Bassler* (Pa). SPENCER co.: near High Grove, *E. L. Braun*, no. 3259 (Braun). WARREN co.: Bowling Green, June, 1892, *Sadie F. Price* (Mo.); bluff along Gasper River, southeast of Hadley, *Leslie Hubricht*, no. B2170 (Mo). UNION co.: moist overflow-forest, near State Lake, *H. T. Shacklette*, no. 345. LYON co.: Kuttawa, *Eggleson*, no. 4524 (NY). TENNESSEE: KNOX co.: woods, Knoxville, *Ruth*, no. 591 (Mo) and 721 (US), *Pennell*, no. 11,301 (Phil). HAMILTON co.: Chickamauga Park, May 27, 1911, *J. R. Churchill*. DAVIDSON co.: bluffs below Nashville, *Biltmore Herb.*, no. 4500^c (US); Nashville, *Eggleson*, no. 4444; limestone cliff of Cumberland River, Nashville, *Pennell*, no. 11,411 (Phil). HOUSTON co.: limestone bank, Erin, *E. B. Harger*, no. 7866. LAKE co.: dense shade of sandy woods, Reelfoot Lake, *J. R. Swallen*, no. 2159 (US). ALABAMA: JACKSON co.: dry soil, Stephenson, *Biltmore Herb.*, no. 4500^a (US); Sand Mountain, *Biltmore Herb.*, no. 4500^d

(US). CLARKE CO.: dry copses and hillsides, Thomasville, April 27, 1888, *C. Mohr*, as *R. ciliosa*, var. *ambigua* (US). MISSISSIPPI: LEE CO.: Tupelo, 1914, *Henshaw* (USNA). OKTIBBEHA CO.: low woods north of Starkville, *C. A. & Una F. Weatherby*, no. 6309. ILLINOIS: KANKAKEE CO.: Kankakee, *C. C. Crampton*, no. 212 (US). PEORIA CO.: rich woods, Peoria, July, 1903, *F. E. McDonald*. HANCOCK CO.: Augusta, *S. B. Mead*. MACON CO.: 3 miles east of Decatur, *Clokey*, no. 2486. PIKE CO.: Mississippi levees, East Hannibal, June 3, 1913 (Mo). RICHLAND CO.: Parkersburg, June 9, 1902, *Robt. Ridgway* (US). MARION CO.: Salem, June, 1860, *M. S. Bebb* (Phil). ST. CLAIR CO.: woods, St. Clair Co., Sept. 20, 1878, *Eggert*; Cahokia, June 11, 1890, *A. S. Hitchcock* (Mo); East Carondelet, June 4, 1875, *Eggert* (Mo, US). JACKSON CO.: black rich soil, bottoms of Big Muddy and Crab Orchard Creeks, *John McCree, Jr.*, no. 775 (Mo.). IOWA: DECATUR CO.: woods, June 29, 1904, *J. P. Anderson* (Mo). MISSOURI: PIKE CO.: dry bluffs, near Eolia, *John Davis*, no. 7617 (Mo). LINCOLN CO.: rich soil, Winfield, June 7, 1916, *John Davis*, no. 1406 (Mo). MARION CO.: Scipio Bluffs, north of Hannibal, *John Davis*, no. 1491 (Mo). ST. LOUIS CO.: Creve Coeur Lake, June 12, 1914, *M. W. Lyon* (Mo); Meramec Highlands, June 13, 1909, *W. W. Ohlweiler* (Mo); Allenton, *G. W. Letterman*, many collections (Mo); rich woods, Allenton, May 29, 1918, *J. R. Churchill*. JEFFERSON CO.: DeSoto, June, 1887, *H. E. Hasse*; Ditmar, *J. H. Kellogg*, no. 2005 (Mo). FRANKLIN CO.: Pacific, *Greenman*, no. 3895 (Mo). SHELBY CO.: rich woods near Bethel, *Palmer & Steyermark*, no. 40,908 (Mo). BUTLER CO.: low woods along Mud Creek, northwest of Rombauer, *Steyermark*, no. 11,420 (Mo). BOONE CO.: Rock Bridge, June, 1926, *H. W. Rickett* (Duke). PHELPS CO.: Jerome, June 1, 1914, *J. H. Kellogg*, no. 494 (Mo). SALINE CO.: Sweet Springs, June 20, 1886, *Wm. Trelease* (Mo). GREENE CO.: Springfield, June 11, 1887, *J. W. Blankinship* (Mo). STONE CO.: rich hillside woods, Galena, *E. J. Palmer*, no. 5774 (Mo, US). DAVIESS CO.: dry banks, Pattonsburg, *Bush*, no. 13,587. JOHNSON CO.: rich woods and thickets, limestone hills, Columbus, *E. J. Palmer*, no. 36,697 (Mo). BARRY CO.: barrens, Shell Knob, *Bush*, no. 15,596 (Mo). JACKSON CO.: Independence, *Bush*, no. 39 (Pa). CASS CO.: bottoms, June 23, 1864, *G. C. Broadhead* (Mo). JASPER CO.: woods, Webb City, *Bush*, no. 528 (Mo), *E. J. Palmer*, no. 528 (Mo). ARKANSAS: CRITTENDON CO.: bottomland, Hulbert, *Demaree*, no. 11,372. PHILLIPS CO.: Crowleys Ridge, Helena, *Demaree*, no. 19,240 (NY, Mo). PULASKI CO.: Little Rock, *H. E. Hasse* (NY); swampy Arkansas bottoms, Little Rock, *Demaree*, no. 17,321 (Mo). KANSAS: LEAVENWORTH CO.: woody ravines, Fort Leavenworth, June, 1854, *F. V. Hayden* (Mo). WYANDOTTE CO.: low woods, May 30, 1897, *K. K. Mackenzie*

(NY). CHEROKEE CO.: woods along Shoal River, near Schimmerhorn Pk., no. 20,178, from *Kansas State College* (NY). RILEY CO.: low woods, *J. B. Norton*, no. 387; Manhattan, June, 1886, *Kellerman* (US). COWLEY CO.: 1895, *C. N. Gould* (NY), May, 1898, *Mark White* (Mo). OKLAHOMA: SEQUOYAH CO.: damp, shaded ground near mouth of Illinois River, *Goodman & Barkley*, no. 2131. LE FLORE CO.: low woods, Poteau, *E. J. Palmer*, no. 8275 (Mo). CREEK CO.: Sapulpa, June 2, 1924, *C. B. Williams*. KAY CO.: woods, Tonkawa, *G. W. Stevens*, no. 1869. OKLAHOMA CO.: wooded creek-bottom north of Edmond, *Waterfall*, no. 1975. POTTOWATTOMIE CO.: in small valley, St. Louis, *Mortimer Faulkner*, no. 106 (Mo). MURRAY CO.: Davis, *W. H. Ennig*, no. 683 (Mo). TEXAS: without stated locality, *Drummond*, no. 259 (cited by Nees under his *Dipteracanthus strepens*, vars. *strictus* and *pedunculatus* and under several other species and varieties!); Coombs Branch, *Reverchon* (Mo). DALLAS CO.: woods, Dallas, May 6, 1874, *Reverchon* (Mo); moist woodlands, Dallas, *Biltmore Herb.* no. 4500^h (US); vicinity of Dallas, *Mary R. Stephenson*, nos. 91 and 94 (US). TARRANT CO.: rich woods near Trinity River, Lake Worth, *Ruth*, no. 318 (Pa, Phil, US). FORT BEND CO.: Richmond, *W. L. Bray*, no. 118 (US). PLATE 841; MAP 1.

2a. Forma CLEISTANTHA (Gray) S. McCoy. Flowers and abundant fruits borne in sessile or subsessile glomerules from the upper and often from most (1-8) of the axils, the stem only occasionally branching: calyx-segments often more pubescent and much shorter than to but little longer than capsule: corolla relatively small, usually reduced to a slender closed tube 0.7-2 cm. long, pale to creamy, but sometimes partially expanding or even large and terminal: capsules abundant, usually plumper and shorter than in typical form of species; retinacula mostly 6 or 8: seeds suborbicular to elliptical, 3-4 mm. long.—*Am. Bot. xliii. 24* (1937). *Dipteracanthus micranthus* Engelm. & Gray in *Bost. Journ. Nat. Hist. v. (Pl. Lindheimerianae), 49* (1845). *Hygrophila illinoiensis* Wood in *Bull. Torr. Bot. Cl. v. 41* (1874). Var. *cleistantha* Gray, *Syn. Fl. N. Am. ii¹. 327* (1878). *R. strepens micrantha* (Engelm. & Gray) Britton in *Mem. Torr. Bot. Cl. v. 300* (1894).—Same range as the typical form of the species. Fl. June-October. The following from a very large representation before me are characteristic (omitting stations enumerated under the preceding). PENNSYLVANIA: LANCASTER CO.: wooded hillside along Conestoga Creek, south of Wabank, *L. F. A. Tanger*, no. 4603 (Pa, Phil); edge of woods along Conestoga Creek, south of Millersville, *Tanger & Groff*, no. 4872. MARYLAND: CECIL CO.: Conowingo, Aug. 19, 1906, *J. J. Carter* (NY, Phil). KENT CO.: Tolchester Beach, September 4, 1906, *C. S. Williamson* (Phil). WEST VIRGINIA: OHIO CO.: thickets near Wheeling Creek, east of Wheeling, July 22, 1909, *Mac Elwee* (Phil). VIRGINIA: CHARLES

CITY CO.: alluvial woods along James River, Harrison Point, *Fernald & Long*, no. 9150. PRINCE GEORGE CO.: wooded swamp by James River, south of Indian Point, *Fernald & Long*, no. 11,153. LOUDON CO.: Short Hill, Aug. 9, 1936, *O. M. Freeman* (USNA). WARREN CO.: bottomlands by Shenandoah River, *Hunnewell*, no. 17,872 (stems, deeply covered by freshet-silts, subligneous, with strong branches and shortened and firm leaves). ROCKBRIDGE CO.: Natural Bridge, Sept. 14, 1907, *E. B. Bartram* (Phil). OHIO: FRANKLIN CO.: Gahanna, Oct. 19, 1903, *O. E. Jennings*. WARREN CO.: moist rich soil along Little Miami River, South Lebanon, *E. B. Harger*, no. 8010. INDIANA: GIBSON CO.: low woods bordering Eggwood Pond, *Deam*, no. 9958 (NY). KENTUCKY: NELSON CO.: wooded ravine east of Chapin, *Wherry & Pennell*, no. 13,673 (Phil). EDMONSON CO.: wooded alluvial flat of Green River, Mammoth Cave, *E. L. Braun*, no. 3611 (Braun). DAVIESS CO.: swamp in Ohio River bottom, Maceo, *Wherry & Pennell*, no. 13,585 (Phil). TENNESSEE: SHELBY CO.: Memphis, Oct. 20, 1850, *Fendler*. ALABAMA: WITHOUT STATED LOCALITY: *Buckley* (paratype of *Dipteracanthus micranthus* Engelm. & Gray). LEE CO.: "N. W. of Lee Co.", June 24, 1897, *F. S. Earle* (NY). ILLINOIS: CHAMPAIGN CO.: Urbana, Oct. 4, 1880, *A. B. Seymour* (Duke). WABASH CO.: Mt. Carmel, 1874, *J. Schneck* (isotypes of *Hygrophila illinoensis* Wood). HARDIN CO.: low woods, Elizabethtown, *E. J. Palmer*, no. 17,023 (Mo). IOWA: HENRY CO.: Mt. Pleasant, *J. H. Mills*, no. 1854 (Mo). MISSOURI: ST. CHARLES CO.: Watson, *Wm. Trelease*, no. 453 (Mo). ST. LOUIS CO.: St. Louis, Sept. 1845, *Engelmann* (paratypes of *Dipteracanthus micranthus*). IRON CO.: moist shady ground, Iron Mountain, Sept. 1897, *Colton Russell* (Mo). MISSISSIPPI CO.: rich swampy woods, Three States Timber Tract, southwest of Wolf Island, *Steyermark*, no. 8761 (Mo). OZARK CO.: thickets along creek, near Bakersfield, *E. J. Palmer*, no. 32,872 (Mo). TANEY CO.: woods, Swan, *Bush*, no. 697 (Mo). SULLIVAN CO.: Pawpaw Junction, Sept. 15, 1893, *Bush* (Mo). HICKORY CO.: low woods along Pomme de Terre River, northeast of Elkland, *Steyermark*, no. 24,514 (Mo). ST. CLAIR CO.: low woods around White Sulphur Spring, *Steyermark*, no. 24,401 (Mo). DALLAS CO.: base of slope along Mangua River, southwest of Long Lane, *Steyermark*, no. 24,231 (Mo). VERNON CO.: low open woods along creek, near Deerfield, *Palmer & Steyermark*, no. 42,140 (Mo, NY). McDONALD CO.: low ground, Noel, *E. J. Palmer*, no. 4069 (Mo, US). ARKANSAS: MARION CO.: bottoms of White River, Flippin, *Demaree*, no. 20,640 (Mo, NY). SALINE CO.: bottoms of Saline River, Benton, *Demaree*, no. 8491 (US). CARROLL CO.: Eureka Springs, *E. J. Palmer*, no. 4439 (Mo). HEMPSTEAD CO.: woods, Fulton, *Bush*, no. 984 (Mo). LAFAYETTE CO.: Spirit Lake, *A. A. & E. G. Heller*, no. 4118.

LOUISIANA: WEST FELICIANA PARISH: deciduous woodland, Catalpa, *Pennell*, no. 4308 (NY). OKLAHOMA: ROGERS CO.: Verdigris, *Bush*, no. 429 (Mo). JOHNSTON CO.: open woods near Tishomingo, *H. W. Houghton* as *Stevens*, no. 3342. PAYNE CO.: Stillwater, *Eugene Blevins*, no. 90 (Mo). TEXAS: WITHOUT STATED LOCALITY: *Drummond*, no. 202 (paratype of the following). HARRIS CO.: rich shaded bottoms around Houston (data with sheet in Herb. Mo), *Lindheimer*, Fasc. II, no. 290 (type and isotypes of *Dipteracanthus micranthus*). BRAZORIA CO.: woods, Columbia, *Bush*, no. 1342 (Mo); San Bernardo, June 28, 1923, *Tharp*. JACKSON CO.: Lavaca River, Aug. 29, 1941, *Tharp*. PLATE 842.

As originally published in *Species Plantarum* (1753) *Ruellia strepens* (from *strepo*, to rustle, presumably from the dehiscing of the capsules) was a mixture. The plant of the Linnean Herbarium, which Linnaeus had before him, has not been available and cannot be until after "the duration". Neither can I discuss the specimens cited in other Linnean works. The name was taken over from *Ruellia strepens, capitulis comosis* of Dillenius, Elth. ii. 330 (misprinted by L. as 300), t. 249, fig. 321 (our PLATE 863), a wholly different plant from that here treated, one of the species (our no. 11) with relatively low hirsute stem, pubescent oblong leaves, dense glomerules of relatively small flowers crowded in the upper axils, and the calyx-segments narrowly linear. The confusion prevailed for some decades (before and after 1753) but in 1771, in his *Observationes in Species Plantarum cum Emendationibus et Animadversionibus*, Mantissa Altera, pp. 315 et seq., Linnaeus redefined *Ruellia strepens* (p. 422) to stand only for the present species ". . . *Pedunculi* oppositi, laterales breves, triflori. *Bractee* 2 oppositae, etiam 2 sub singulo flore laterali. *Calyx* 5partitus, lanceolatus" etc. He thus threw out the wholly different plant of Dillenius (with abundant fruit which, when pressed, promptly rustles) and restricted the name to the showy-flowered and usually infertile or only weakly fertile typical *R. strepens* which, except in the cleistogamous state (unknown to Linnaeus), rarely gets a chance to rustle! Schkuhr, Willdenow, Pursh, LeConte, Torrey, Gray, Engelmann, Nees, Britton and all others have consistently adopted the redefinition made in Mantissa Altera, and only confusion would result if the pre-Linnean and confused application of the name were forced. Our species, preeminently of calcare-

ous bottomland and bases of limestone bluffs, with great concentration in the Mississippi Basin (MAP 1), pushes down to the Atlantic area along the Susquehanna, Potomac, James, Santee and Savannah River systems. It is on the upper Roanoke, and, presumably, search may bring it to light farther down that valley, even in northeastern North Carolina. In the great accumulation of material before me, from some of the more representative larger herbaria, there is no evidence that it is common in either North or South Carolina; and from Georgia I have seen it only from tributaries of the Tennessee (thence the Mississippi) River, although (since it has been found at Aiken) it is probably along the Savannah in Georgia. The *Ruellia strepens*, *capitulis comosis* of Dillenius was raised from seed sent from Carolina and flowered in 1726: "Nata fuit haec species e seminibus Carolinensibus, & Septembri mense primum floruit anno 1726, sequentibus autem annis tota fere aestate". This plant (our no. 11), abundant in eastern North and South Carolina as well as reaching eastern Virginia, is inclined to grow in slightly dry and rather acid soils.

It is a very striking fact that the accumulated material before me shows forma *cleistantha* regularly and abundantly fruiting, while the typical form, with few peduncles from a few median axils and few showy, expanded flowers, is largely sterile. Of the 270 sheets of typical *R. strepens* before me only 12 (4½ per cent.) show 1 or 2 developed capsules (PLATE 841, FIG. 4); all of the 168 sheets of forma *cleistantha* are loaded with fruit or show the possibility of it.

When he reduced Gray's var. *cleistantha* to the rank of a form Mr. Scott McCoy reported on plants brought into the garden: "Each June it bloomed as the species and each fall it bore cleistogamous flowers as does the so-called variety *cleistantha* Gray." Further checks should be made in other regions for, if all the material in the United States National Herbarium, the Torrey and Britton Herbaria of the New York Botanical Garden, the herbaria of the Missouri Botanical Garden, the Philadelphia Academy of Sciences, the University of Pennsylvania and several smaller collections, added to the representation in the Gray Herbarium, can be taken (and I believe it can) as a fair average, there are some very important characters distinguishing the two



Photo. B. G. Schubert.

RUELLIA PINETORUM: FIG. 1, flowering and fruiting branches from TYPE, $\times 1$; FIG. 2, portion of fruiting branch, $\times 1$; FIG. 3, portion of leafy base, $\times 1$; FIG. 4, calyx and capsule, $\times 2$; FIG. 5, surface of peduncle, $\times 10$; FIG. 6, bases of calyx-segment and capsule, $\times 10$.



Photo. B. G. Schubert.

RUELLIA PURSHIANA; FIG. 1, portions of TYPE, $\times \frac{2}{5}$; FIG. 2, third node from base, $\times 1$; FIG. 3, second node from base, $\times 1$; FIG. 4, calyx and capsule, $\times 2$; FIG. 5, surface of stem, $\times 4$.

plants which one would not expect to find if forma *cleistantha* always develops from individuals which early in the summer were typical *R. strepens*. Typical showy-flowered *R. strepens* bears 1–3 flowers on few leafy-bracted peduncles from the median axils; forma *cleistantha* has the flowers more densely crowded in nearly sessile glomerules, usually from many, including the upper, axils. Of the 270 sheets of typical *R. strepens* before me 145 (nearly 54 per cent.) have elongate median peduncles 2–10 cm. long; when rarely such plants fruit (July 25, Va., *Fernald & Long*, no. 13,463; July 22, Ky., *Braun*, no. 3259; June 25, Mo., *Hasse*, no. 1094; July 7, Mo., *Steyermark*, no. 11,420; July 13, Mo., *Palmer*, no. 8275; August 27, Kans., *Norton*; etc.) they show no incipient sessile glomerules in the upper axils, such as one would expect if they always change to forma *cleistantha*. The peduncles are still there, up to autumn. Of the 168 sheets of forma *cleistantha* only 20 (11.5 per cent.) have such peduncles (not counting branches with subsessile glomerules). Furthermore, very many specimens with only glomerulate fruits in the middle and upper axils were collected pretty early in the season, June 17–August 18 (W. Va., *McElwee*; Ky., *Price*; Ill., *Eggert*; Mo., *Palmer*, no. 1310; Ark., *Heller & Heller*, no. 4118), their fruiting period overlapping the flowering period of typical *R. strepens*. It must be evident, then, that not always do typical early and showily flowering plants of *R. strepens* change late in the season into forma *cleistantha*; if they did so a much larger percentage of the latter would retain the elongate peduncles of the former, and the former, late in the season, would regularly bear crowded fruits in the upper axils. The problem is a promising one for the experimenter. Do the abundant seeds of the cleistogamous plant reproduce only the cleistogamous form or do they equally yield the typical showy-flowered and largely infertile plant? Carefully checked and numerous cultures are necessary before we can say with finality.

3. *R. PEDUNCULATA* Torr. Stem 1–7.5 dm. high, slender, firm, obtusely quadrangular or subterete, puberulent or minutely cinereous-pilose, with long internodes, simple, with axillary peduncles, to branched; the branches ascending and but slightly forking to more divergent and much divided, often bushy in habit; leaves ovate to ovate-oblong or lanceolate, short-petioled, tapering from slightly above base, pale green, puberulent,

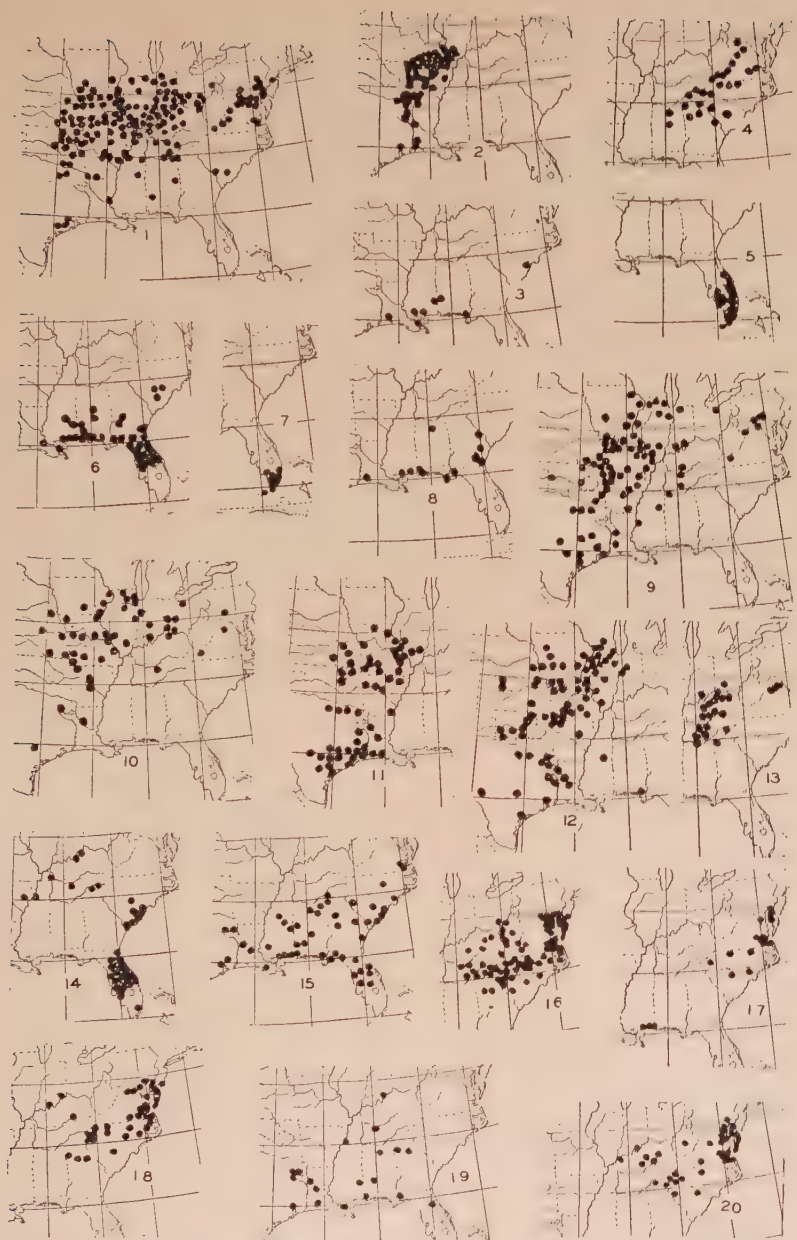
entire or very shallowly undulate; those of primary axis (above the rounded or obovate lowest ones) 3–11 cm. long and 2–4.5 cm. broad, the rameal smaller: flowers solitary at tips of simple 2-bracted peduncles or loosely cymose on the branches; the cymes, when developed, 2–several-flowered: calyx-segments linear-filiform, 0.5–1 mm. wide at base, thence tapering to very slender often flexuous tips, in maturity 1–3 cm. long, closely cinereous-hirtellous with slender-tipped spreading pubescence: corolla blue-violet, 2.5–5.5 cm. long; the slender tube about equaling the ampliate throat: ovary and capsule cinereous-puberulent; the capsule 1–2 cm. long; retinacula usually 6 or 8: seeds orbicular or suborbicular, cinereous, 2.5–3.5 mm. in diameter.—*R. pedunculata* Torr. ex Gray, Syn. Fl. N. Am. iii. 325 (1878).—Woods, bluffs, rocky slopes, barrens, open fields, etc., in calcareous to circumneutral soil, western Louisiana and eastern Texas, north to southern Illinois, eastern and south-central Missouri and eastern Oklahoma. The following are representative. ILLINOIS: JACKSON co.: Murphysboro, *Benke*, no. 4648 (US); mesophytic woods, Makanda, June 20, 1903, *Gleason*; dry upland or rocky woods, Grand Tower, *Gleason*, nos. 1793, 2654, 2655 (all as *R. strepens*); dry rocky limestone hillsides, Grand Tower, *Gleason*, no. 9007 (NY). JOHNSON co.: rocky woods, Tunnel Hill, June 27, 1902, *J. Schneck* (NY). UNION co.: dry sandstone bluff, Cobden, May 23, 1902, *F. S. Earle* (NY). [In Herb. Duke Univ. there is a specimen of *R. pedunculata*, bearing a label, "*Ruellia strepens*, Nees. Urbana, Ill. Oct. 4, 1884, W." with the heading "Herbarium of Merton B. Waite" and, printed above it, "Herbarium of A. B. Seymour". Since *R. strepens* is well known from the region of Urbana, where frequently collected, while there is no other evidence of *R. pedunculata* from northeast of the southwestern corner of Illinois, it is probable that in the wanderings of this material some transfer of labels has occurred]. MISSOURI: JEFFERSON co.: rich woods in ravine, southwest of Crystal City, *Steyermark*, no. 1357 (Mo); dry copses, DeSoto, May 30, 1887, *Hasse* (Mo, US). STE. GENEVIEVE co.: Bloomdale, *J. H. Kellogg*, no. 2004. CAPE GIRARDEAU co.: wooded limestone slopes, Hickory Ridge, west of Delta, *Steyermark*, no. 20,811 (Mo). DUNKLIN co.: Campbell, uncommon, *Bush*, no. 343 (Mo, NY). MADISON co.: rocky open woods, near Fredericktown, *E. J. Palmer*, no. 31,608 (Mo). WAYNE co.: low woods in Happy Hollow, north of Kime, *Steyermark*, no. 6318 (Mo). BUTLER co.: rocky upland woods, Poplar Bluff, *E. J. Palmer*, no. 16,345 (Mo); cherty slopes bordering lowlands along Mud Creek, northwest of Rombauer, *Steyermark*, no. 11,422 (Mo). IRON co.: Arcadia, *Greenman*, no. 3750 (Mo, Phil); rocky open woods near Ironton, *E. J. Palmer*, no. 18,111. REYNALDS co.: cherty slopes, south of Oates, *Steyermark*, no.

19,724 (Mo). CARTER CO.: rocky woods, Van Buren, *J. H. Kellogg*, no. 15,300 (Mo). PHELPS CO.: Jerome, June 11, 1914, *Kellogg* (Mo). SHANNON CO.: rocky woods, Monteer, *Bush*, nos. 6401 and 6401 A. TEXAS CO.: wooded limestone slopes at base of bluffs along Big Pine River, southeast of Prewitt Spring, *Steyermark*, no. 20,077 (Mo). OREGON CO.: stony grove, Thayer, *F. W. Pennell*, no. 11,521 (Phil). OZARK CO.: cherty limestone slopes on top of bluff along White River, northeast of Dormio, *Steyermark*, no. 10,417 (Mo). DOUGLAS CO.: limestone glade and cherty open woods, between Roosevelt and Richville, *Steyermark*, no. 19,165 (Mo). WRIGHT CO.: open hillside, west of Cedar Gap, *O. E. Lansing*, no. 3020. LACLEDE CO.: cherty bottom of Pine Creek Hollow, southwest of Nebo, *Steyermark*, no. 25,159 (Mo). WEBSTER CO.: limestone outcrops, south of Fordland, *Steyermark*, no. 19,239 (Mo). TANAY CO.: common in woods, Swan, *Bush*, no. 236 (Mo, US); open rocky ground near Gretna, *E. J. Palmer*, no. 19,224. STONE CO.: dry rocky hillside by James River, *E. J. Palmer*, no. 5831 (Mo, US). BARRY CO.: dry woods around Eagle Rock, Sept. 24, 1896, *K. K. Mackenzie* (Mo, NY); Eagle Rock, *Bush*, nos. 78 and 1551 (Mo, NY, US). McDONALD CO.: dry ground, *Bush*, no. 283. ARKANSAS: CRAIGHEAD CO.: open sandy soil, Jonesboro, *F. W. Pennell*, no. 11,510, as *R. ciliosa* (Phil); open woods, Bono, *Demaree*, no. 3519 (Mo). SHARP CO.: Hardy, *W. H. Emig*, no. 152 (Mo). FULTON CO.: dry cherty forest, Mammoth Spring, *F. W. Pennell*, no. 11,558 (Phil). IZARD CO.: sandstone, east of Guion, *Pennell*, no. 10,692 (NY, Phil). LONOKE CO.: fallow fields, Carlisle, *Demaree*, no. 17,516 (Mo, NY). DREW CO.: woods, Monticello, *Demaree*, no. 14,969 (Mo, NY). FAULKNER CO.: open fields, Conway, as *R. ciliosa*, *Flora A. Hass*, no. 1746 (US). GARLAND CO.: near Hot Springs, *Runyon*, nos. 1142 (NY) and 1439 (US). PULASKI CO.: low ridges, Fort Roots, *Demaree*, no. 17,301 (Mo, NY); Little Rock, *Demaree*, nos. 17,325 (Mo, NY) and 17,516 (Mo, NY). POPE CO.: Nogo, *Geo. M. Merrill*, no. 342 (Mo). NEVADA CO.: southeast of Prescott, June 3, 1912, *Mabel P. Hollister* (US). CARROLL CO.: dry open ground, Eureka Springs, *E. J. Palmer*, nos. 4378 (Mo, US) and 20,483 (NY). HEMPSTEAD CO.: near McNab, *Greenman*, no. 4417 (Mo). FRANKLIN CO.: rocky hillside, Ozark, *F. W. Pennell*, no. 10,622 (NY, Phil). HOWARD CO.: Baker Springs, Oct. 5, 1909, *J. H. Kellogg*. BENTON CO.: 1889, *E. N. Plank* (NY). WASHINGTON CO.: Savoy, May 18, 1922, *E. T. Wherry* (US). SEBASTIAN CO.: Fort Smith, 1853-4, *J. M. Bigelow*, paratypes (US). LOUISIANA: WITHOUT CITED STATION: *Hale*, ISOTYPE. NATCHITOCHES PARISH: dry open ground, Natchitoches, *E. J. Palmer*, no. 7511 (Mo, NY, US). ST. LANDRY PARISH: dry woods, Opelousas, *Carpenter & Hale* (US). JEFFERSON DAVIS PARISH: knolls in low prairies, Welsh, *E. J.*

Palmer, no. 7649 (US). OKLAHOMA: LE FLORE CO.: woods, near Page, *G. W. Stevens*, no. 1423. MCCURTAIN CO.: woods near Idabel, *H. W. Houghton* as *G. W. Stevens*, nos. 3625 and 3638. TEXAS: BOWIE CO.: near Texarkana, *A. A. & E. G. Heller*, no. 4171 (Mo, NY, US). HARRISON CO.: woods, Marshall, *Bush*, no. 781 (Mo). CASS CO.: rocky woodland, Hughes Springs, *Biltmore Herb.*, no. 10,679^a (US). CHEROKEE CO.: dry sandy ground, Jacksonville, *E. J. Palmer*, no. 8600 (Mo, NY, US). ANDERSON CO.: Palestine, April 19, 1895, *E. N. Plank* (NY). UPSHUR CO.: sandy woods, Big Sandy, May 28, 1901, *Reverchon* (Mo); common in sand, Big Sandy, *Reverchon*, no. 2535 (Mo, NY). SAN AUGUSTINE CO.: open woods, *Geo. L. Crocket* (US). HARRIS CO.: Houston, 1917, *Ada Hayden*. PLATE 843; MAP 2.

In view of its very definite characters it is remarkable that the earlier collectors seem not to have secured *Ruellia pedunculata* and that it was not described until 1878. It is not improbable that Nees included it in his complex and chiefly tropical *Cryphiacanthus barbadensis*. In his treatment in DC. Prodr. xi. 197 (1847) Nees gave the broad range of the latter as tropical America, thence to Virginia, Carolina and Texas ("In Americae calidioris . . . inde a prov. Virginiâ, Carolinâ et Texas") but under the citation of specimens he gave nothing from the United States. Since his *C. barbadensis* had long peduncles with cymes, subovate leaves, and subulate-acuminate calyx-segments, the Texan element was presumably *R. pedunculata*. The representatives of the latter in Virginia and Carolina are the two following, only the first of which has "pedunculis subeymosis".

4. *R. pinetorum*, sp. nov. (tab. 844), planta habitu *R. pedunculatae*; caule 1-3 dm. alto puberulo obtuse quadrangulato vel subtereto subsimplice vel divergenter ramoso vel ramosissimo internodiis elongatis; foliis oblongis vel elliptico-lanceolatis breviter petiolatis obtusis vel subacutis subcoriaceis minute lineolato-puberulis vel glabratibus integris vel undulatis, majoribus 2-3.8 cm. longis 0.8-1.8 cm. latis; pedunculis axillaribus 0.2-3 cm. longis 1-3-floris, bracteolis oblongis petiolatis calyce brevioribus; calycis laciniis lineari-acicularibus deinde 1.3-2 cm. longis a basi 0.5-1 mm. latis attenuatis dorso cystolithos gerentibus; corollis caeruleo-purpureis 3-4 cm. longis, tubo cylindrico 1.5-2 cm. longo, fauce 1-1.5 cm. longo supra 6-10 mm. diametro, limbo (expanso) 2-4 cm. lato; capsulis glabris 1.2-1.6 cm. longis, seminibus orbicularibus 3 mm. diametro.—Low pine barrens of the Coastal Plain, South Carolina (possibly Virginia) to northern Florida and Louisiana, apparently local. SOUTH CAROLINA: Horry co.: low pine barrens, July 28, 1936, *F. G.*



Ranges of RUELLIA. Map 1, *R. STREPENS*; 2, *R. PEDUNCULATA*; 3, *R. PINETORUM*; 4, *R. PURSHIANA*; 5, *R. HETEROMORPHA*; 6, *R. CILIOSA*; 7, *R. SUCCULENTA*; 8, *R. NOCTIFLORA*; 9, *R. HUMILIS*, var. *TYPICA*; 10, *R. HUMILIS*, var. *FRONDOSA*; 11, *R. HUMILIS*, var. *LONGIFLORA*; 12, *R. HUMILIS*, var. *EXPANSA*; 13, *R. HUMILIS*, var. *CALVESCENS*; 14, *R. CAROLINIENSIS*, var. *TYPICA*; 15, *R. CAROLINIENSIS*, var. *SEMICALVA*; 16, *R. CAROLINIENSIS*, var. *MEMBRANACEA*; 17, *R. CAROLINIENSIS*, var. *NANELLA*; 18, *R. CAROLINIENSIS*, var. *CHELONIFORMIS*; 19, *R. CAROLINIENSIS*, var. *SALICINA*; 20, *R. CAROLINIENSIS*, var. *DENTATA*

Tarbox, no. 800, TYPE in U. S. Nat. Herb. FLORIDA: CALHOUN CO.: low grounds, Iola, May, 1896, *Chapman*, three specimens, one unnamed, one marked "n. sp.", with entry of an unpublished name which appears in American herbaria on sheets of at least two other and quite different species (therefore unwise to take up), the third marked "sp. nov. affin. *R. pedunculata*" (Mo). ALABAMA: WASHINGTON CO.: Fruitdale, July, 1904, as *R. pedunculata*, *Southern Floral Nursery Co.* (Mo). MISSISSIPPI: WAYNE CO.: Waynesboro, Aug. 8-9, 1896, *C. L. Pollard*, as *R. strepens*, no. 1220 (Mo, NY, US). HARRISON CO.: Cuevas, Sept. 8, 1900, *Lloyd & Tracy*, no. 346 (NY). LOUISIANA: ST. TAMMANY PARISH: Covington, Sept., 1919, as *R. parviflora*, *G. Arsène*, no. 11,687 (US). ORLEANS PARISH: New Orleans, 1832, *T. Drummond*, nos. 257 in part (as *R. strepens*); 258 in part and 259 in part (as *R. longiflora*), the numbers inextricably confused, two of them appearing on one label. CALCASIEU PARISH: vicinity of Lake Charles, May 28, 1904, and other dates (not given) in 1904, *Andrew Allison*, nos. 57, 261 and 297, all as *R. pedunculata* (all US). MAP 3.

Ruellia pinetorum is the southeastern Coastal Plain representative of *R. pedunculata* and most of the few specimens seen were identified with that species which centers on the Ozark Upland. *Chapman* correctly understood it as a new species of this relationship but, as explained, the name he proposed but did not publish has been entered as a wholly new name on many sheets of at least two other species and should not be taken up. The finest material is that in the National Herbarium collected by Mr. *Tarbox* in low pine barrens of Horry County, South Carolina. I am, therefore, treating this as the type. In the chiefly Ozarkian *R. pedunculata* the leaves are more ovate, the primary ones 3-11 cm. long and 2-4.5 cm. wide; in *R. pinetorum* the leaves are oblong to elliptic-lanceolate and only 2-3.8 cm. long by 0.8-1.8 cm. wide. In *R. pedunculata* the broad bracts, especially in the simpler-stemmed plant with peduncles bearing solitary terminal flowers, nearly equal to greatly exceed the calyx; in *R. pinetorum* the narrow bracts are much shorter than the calyx. In *R. pedunculata* the calyx is copiously hirtellous with divergent sharp-tipped trichomes; in *R. pinetorum* glabrous or nearly so and closely invested with elongate and partially imbedded cystoliths. In *R. pedunculata* the corolla-tube and the ampliate throat are subequal in length; in *R. pinetorum* the tube is much longer than the less ampliate throat. In *R. pedunculata* the capsule is cinereous-puberulent; in *R. pinetorum* glabrous.



Photo. B. G. Schubert.

RUELLIA PURSHIANA: FIG. 3, summit of capsule, showing pilose surface, $\times 10$.

R. PURSHIANA, forma CLAUSTROFLORA: FIG. 1, summit of type, $\times 1$; FIG. 2, uppermost node, with small cleistogamous flowers (above) and capsule, $\times 2$.

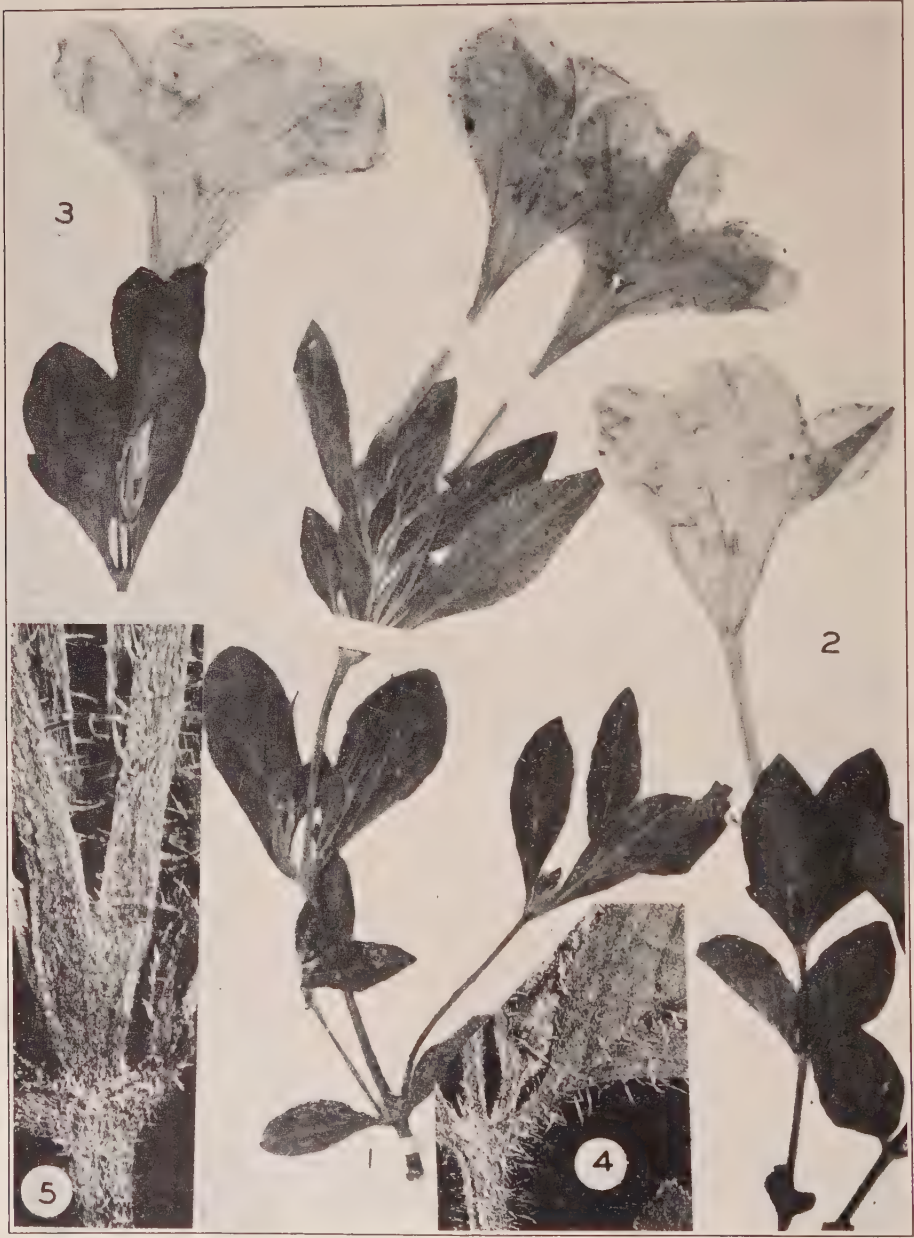


Photo. B. G. Schubert.

RUELLIA HETEROMORPHA, vernal stage; FIGS. 1-3, portions of flowering stems, $\times 1$; FIG. 4, summit of internode and base of leaf, $\times 4$; FIG. 5, base of calyx, $\times 10$.

The very few specimens assembled indicate that *Ruellia pinetorum* is a very local plant. Now that attention is called to it, it is hoped that fuller material will become available. As noted under *R. pedunculata*, it is probable that this is the plant intended by Nees when, in DC. Prodr. xi. 197 (1847), he noted his quite different tropical *Cryphiacanthus barbadensis* as extending northward to Virginia and Carolina. No other plant known in the East satisfies his "pedunculis subcymosis petiolo longioribus vel et folium aequantibus superantibusve". We do not now know *R. pinetorum* from Virginia but so many species are now known to "jump" from eastern South Carolina or southeastern North Carolina to southeastern Virginia that *R. pinetorum* may well (before the destruction of most of the pine barrens) have been one of them. Really quite as closely related to the Ozarkian *R. pedunculata*, as is the Coastal Plain *R. pinetorum*, is the following beautiful species which centers on the Appalachian Upland.

5. *R. Purshiana*, sp. nov. (TAB. 845 et TAB. 846, FIG. 3), planta habitu plantae simplicissimae *R. pedunculatae*; caule simplice recto vel ramis erectis paucis gracile 1.5–6 dm. alto cinereo-puberulo internodiis elongatis; foliis membranaceis majoribus elliptico-vel lanceolato-ovatis basi attenuatis apice obtusis vel acutis integris vel subtile undulatis ad venas puberulis plus minusve hirtellis vel glabratibus, axis primarii 3–6-jugis remotis 2.5–10 cm. longis 1.5–4.3 cm. latis, petiolo gracili 0.5–2 cm. longo; pedunculis 1-floris 0.2–3 cm. longis axillaribus ad 1–2 (–4) nodos imos apice bracteatis; bracteis ellipticis vel ovalibus; axillis superioribus efloriferis; calycis segmentis anguste linearibus 0.7–1.2 mm. latis apice attenuatis minute cinereo-pilosis vel -hirtellis deinde 1.6–2.8 cm. longis; corollis 3–5 cm. longis caeruleo-purpureis vel pallide purpureis vel albescentibus, tubo cylindrico 1.5–3 cm. longo, fauce ampliato supra 0.8–1.4 cm. diametro, limbo (expanso) 3–4 cm. lato; capsulis minute strigoso-hirtellis vel pilosis 1.5–1.8 cm. longis; retinaculis 8.—*R. ciliosa*, var. *hybrida* Gray, Syn. Fl. N. Am. ii¹. 326 (1878) in part only. *R. parviflora* sensu Britton in Britton & Brown, Ill. Fl. ed. 2, iii. 241, fig. 3891 (1913) at least as to fig., not *R. parviflora* (Nees) Britt. (1901) at least as to basonym, *Dipteracanthus cilius*, var. *parviflorus* Nees (1842).—Dry to moist woods, bluffs, granitic or calcareous slopes, etc., western Maryland, south along the mountains and locally on the Piedmont to eastern Virginia, central South Carolina, Georgia and Alabama. MARYLAND: FREDERICK CO.: W. F. A. Aiken, as *R. strepens*, altered

to *R. caroliniensis* (Phil). VIRGINIA: FREDERICK CO.: woods, Cedar Creek, June 2, 1929, *Hunnewell*, no. 11,135 (FWH); limestone cliffs, Cedar Creek, June 5, 1936, *Hunnewell* (VPI); both as *R. caroliniensis*, var. *parviflora*; Meadow Mills, June 9, 1935, *O. M. Freeman* (USNA), as *R. ciliosa*. ROCKINGHAM CO.: Paul's Fort, *Frederick Pursh* (Phil). ROCKBRIDGE CO.: Natural Bridge, May 28 and 29, 1909, *E. B. Bartram*, as *R. parviflora*, one sheet (Gray) changed by later student to *R. humilis* "Pursh", another (Phil) to *R. caroliniensis*; "Glasgow", June 1, 1891, *J. R. Churchill*, as *R. ciliosa*, var. *ambigua* (Mo). BOTETOURT CO.: Indian Rock, June, 1887, *H. E. Wetherill*, as *R. strepens* (Pa). WASHINGTON CO.: shaly banks, vicinity of Mendota, *L. G. Carr*, no. 572, as *R. caroliniensis*. ROANOKE CO.: Roanoke, May 29, 1890, *Brown, Hogg, Vail, Timmerman, Britton & Britton*, as *R. ciliosa*, var. *ambigua* (NY); wooded limestone slope along Roanoke River at Dixie Caverns, July 6, 1942, *C. E. Wood, Jr.*, no. 3673, as *R. caroliniensis*. BEDFORD CO.: July 8, 1871, *A. H. Curtiss*, one of the several quite dissimilar sheets marked by Gray as his *R. ciliosa* var. *ambigua*, one of the Curtiss specimens tagged by a later student as *R. caroliniensis*, the other as *R. hybrida*. AMELIA CO.: June 5, 1937, *J. B. Lewis*, no. 626, as *R. ciliosa*, var. *parviflora* (VPI). HENRICO CO.: Richmond, *De Chalmot*, as *R. pedunculata* (US). NORTH CAROLINA: ORANGE CO.: open woods, Upper New Hope Creek, Duke Forest, May 27, 1932, *Blomquist*, no. 4911, as *R. caroliniensis* (Duke); New Hope Creek, Duke Forest, May 20, 1933, *Blomquist & Oosting*, no. 3364, as *R. parviflora* (Duke); dry bank near University Lake, on Neville's Creek, northwest of Chapel Hill, May 29, 1940, *Radford & Stewart*, no. 654a, as *R. ciliosa* (NC). GUILFORD CO.: near High Point, May 22, 1902, *Biltmore Herb.*, no. 14718^d, as *R. parviflora* (NY, US). FORSYTH CO.: Salem, *Schweinitz*, as *R. strepens*, altered by others, first to *R. ciliosa*, later to *R. caroliniensis* (Phil); woods, Winston-Salem, Aug. 20, 1921, *P. D. Schallert*, as *R. ciliosa*, May 30, 1934, *Schallert*, no. 6509, as *R. strepens* (Schallert). RUTHERFORD CO.: Cuba, June 27, 1887, *L. W. Lynch*, no. 36, as *R. strepens* (NC). MADISON CO.: Marshall, May 28, 1904, *Biltmore Herb.*, no. 14718^c, as *R. parviflora* (US); dry woods, Hot Springs, June 2, 1899, *J. R. Churchill*, as *R. ciliosa*, var. *parviflora* (Mo). SOUTH CAROLINA: SUMTER CO.: Sept., 1937, *E. E. Holdaway*, no. 73, as *R. ciliosa* (Duke). ANDERSON CO.: 1886, *Miss F. Earl*, as *R. strepens* (VPI); Andersonville, 1884, *N. H. E.* (NY). OCONEE CO.: Keowee, May 20, 1906, *H. D. House*, no. 2171, as *R. parviflora* (NY). GEORGIA: WITHOUT STATED LOCALITY: mountains of Georgia, *Chapman*, as *R. ciliosa*, var. *ambigua* (Mo). BURKE CO.: woods, Shell Bluff on Savannah River, April 23, 1936, *Leeds & Harper*, no. 2756, as *R. parviflora* (Phil). OGLETHORP CO.: granite outcrop west of Lex-

ington, May 28, 1934, *Francis Harper*, as *R. parviflora* (Phil). DEKALB CO.: Stone Mountain, May 23, 1897, *Henry Eggert* (Mo); mixed woods, Emory University campus, April 30, 1936, *Don Eyles*, no. 695, as *R. parviflora* (Duke). FLOYD CO.: Rome, *Chapman* (Mo), as *R. ciliosa*, var. *hybrida*; dry hillsides near Silver Creek, May 11, 1899, *Biltmore Herb.*, no. 849^d, as *R. ciliosa* (TYPE in Herb. U. S. National Herb.). TENNESSEE: KNOX CO.: Knoxville, May 14, 1889, *Lamson-Scribner*, as *R. strepens*, changed by later students to *R. ciliosa* and to *R. parviflora* (US); woods and groves, Knoxville, July, 1897, *Ruth*, no. 9572, as *R. strepens* (NY); woodlands, Knox County, May, 1898, *Ruth*, no. 737, as *R. strepens* (NY). ALABAMA: BLOUNT CO.: rocky woodlands, Bangor, May 20, 1902, *Biltmore Herb.* no. 14,718, as *R. ciliosa*, var. *parviflora* (US). JEFFERSON CO.: Birmingham, May 24, 1901, *F. S. Earle*, as *R. parviflora* (NY). MAP 4.

5a. Forma **claustriflora**, f. nov. (TAB. 846, FIG. 1 et 2), floribus in glomerulis axillaribus aggregatis, glomerulis ad nodos omnes gestis; corollis tubulosis clausis 4–8 mm. longis apice dense pilosis; capsulis numerosis.—VIRGINIA: WITHOUT STATED LOCALITY: 1843, *Gray & Sullivant*, as *R. strepens*. ROCKBRIDGE CO.: “ex umbrosis Virginiae juxta Virginia Natural Bridge”, Sept. 14, 1884, *John Ball* (US), identified by a later student as *R. strepens*, afterward changed to *R. parviflora*; Natural Bridge, Sept. 4, 1885, *N. L. & E. G. Britton*, as *R. strepens*, var. *cleistantha* (NY). TENNESSEE: COCKE CO.: within three miles of Wolf Creek Station, Aug. 31, 1897, *Kearney*, no. 863, as *R. ciliosa*, var. *hybrida* (Mo and NC), TYPE in Herb. Missouri Botanical Garden.

Ruellia Purshiana, named for FREDERICK PURSH, who first collected the species in the mountains of Virginia, is, when assembled from the very miscellaneous covers in which it has been confused, under 11 misidentifications, with no less than 7 species, stands out as a remarkably definite species of the Appalachian Upland. Although this is doubtless the plant chiefly intended by Gray when he conceived his *R. ciliosa*, var. *ambigua*, “as if a hybrid between *R. ciliosa* and *R. strepens*, with the aspect of the latter, but the calyx of the former”, it can not be overlooked that Gray promptly lost his bearings in applying the name *R. ciliosa*, var. *ambigua*, for sheets carrying the printed annotation-slip “Syn. Fl. N. Amer.” and marked by Gray as *R. ciliosa*, var. *ambigua* belong to no less than five species: the present one (in Herb. Gray); a Floridan sheet in Torrey’s Herbarium containing at least three species, none of them like anything else included by Gray in his var. *ambigua*; and a mixed sheet in Herb. Gray, con-

taining a sprig of *R. pedunculata* Torr. from Arkansas and the top of a plant of the very different Texan *R. Drummondiana* (Nees) Gray (this mixed sheet later misidentified as *R. "carolinensis"*). I have not located the Kentucky plant included by Gray under *R. ciliosa*, var. *ambigua*. Even though we can infer that by his description and note Gray meant chiefly the plant I am here calling *R. Purshiana*, it is evident that, as he originally labelled specimens, the name *R. ciliosa*, var. *ambigua* was emphatically a *nomen ambiguum*. The name has subsequently been further misapplied. I am, therefore, assigning to the species with somewhat the aspect of *R. strepens* but with much more slender calyx-segments a new name, typified by a characteristic sheet of specimens.

That *Ruellia Purshiana* simulates very extreme plants of *R. strepens* with short leaves there can be no question. Some specimens of the latter, especially those from upland and dry habitats, consequently with greatly reduced stature and abbreviated leaves, are superficially similar (such specimens as the following: dry ground, Chickamauga Park, Georgia, May 25, 1911, *Churchill* (G); open woodlands, Coalgrove, Ohio, *Biltmore Herb.*, no. 4500^f (US); dry ground near Chattanooga, Tennessee, May 27, 1911, *Churchill*; and dry soil, Stevenson, Jackson County, Alabama, *Biltmore Herb.*, no. 4500^a (US)). There the resemblance stops, except for the possibly significant fact that both species have the showy flowers mostly solitary on few axillary peduncles and rarely producing fruit, and also have cleistogamous forms with glomerules of several highly fertile flowers in many of the upper axils. In *R. strepens* the stem is glabrous, pilose in lines or rarely over the whole surface; the lanceolate calyx-segments are flat to the tip, 2-4 mm. broad, and conspicuously villous-ciliate; and the capsules glabrous. *R. strepens* is usually a plant of rich calcareous woods, oftenest on wooded bottoms, with its greatest concentration in the Mississippi Basin (MAP 1). *R. Purshiana* (MAP 4) is a plant of dry rocky or upland habitats, sometimes on limestones but often (as on Stone Mountain) in granitic or somewhat acid soils. Its stem is closely cinereous-puberulent; its calyx-segments linear and only 0.7-1.2 mm. wide below the middle, thence tapering to almost thread-like tips, and its surfaces are densely cinereous-hirtellous. The capsules, too, are

closely and minutely hirtellous. *R. Purshiana* was illustrated, erroneously as *R. parviflora*, in Britton & Brown, Ill. Fl. ed. 2, iii. fig. 3891. It certainly has nothing to do with the type of *R. parviflora*, which rests upon *Dipteracanthus ciliatus*, var. *parviflorus* (see p. 2).

In its minutely puberulent and slender stem, its slender calyx-segments and pubescent capsule *Ruellia Purshiana* is similar to the simpler-stemmed and least floriferous states of the chiefly Ozarkian *R. pedunculata* (MAP 2); but in these least branching plants of *R. pedunculata* (PLATE 843) the peduncles are soon widely divergent; the linear-acicular calyx-segments taper from base to apex; the showy flowers are quite fertile and regularly followed by capsules. So far as we know *R. pedunculata* does not have a cleistogamous form.

Although *Ruellia Purshiana* has often been identified as *R. ciliosa* Pursh, *R. caroliniensis* (Walt.) Steud., *R. parviflora* (Nees) Britton, *R. hybrida* Pursh, and even as *R. humilis* Nuttall, such identifications merely reflect the general lack of clarity regarding specific characters and the current and still inevitable vagueness about the early-proposed species. The earliest of these names or their basonyms is *Anonymos caroliniensis* Walt. Fl. Carol. (our no. 11). Although no specimen now exists as type of Walter's species, his remarkably detailed description, "caule tetragono hirsuto; foliis . . . hirsutis, . . . ; floribus sessilibus purpureis", surely does not apply to *R. Purshiana*. *R. ciliosa* Pursh (our no. 7) from near Savannah, was a branching plant, with subsessile ovate-oblong (really, apparently, obovate) leaves with margins and veins ciliate with long white hairs, the calyx-segments four times shorter than the corolla-tube (calycis laciniis subulatis tubo corollae quadruplo brevioribus). Such a plant could not be *R. Purshiana*; in fact, when Pursh twice collected the latter in the mountains of Virginia, he did not venture to name it. *R. hybrida* Pursh (see discussion under no. 11) also from Savannah, is quite as remote: much branched (ramosissima) and hirsute with white hairs, the oblong leaves densely hirsute, etc. *R. humilis* Nutt. (our no. 10), an essentially sessile-leaved and usually freely divergent-branched plant, originally from Arkansas, has nothing to do with *R. Purshiana*; and as to *R. parviflora* (see p. 2), that ill-defined name goes back to *Dip-*

teracanthus ciliosus, var. *parviflorus* Nees, from the Kentucky River, and with an impossible description for any North American member of *Ruellia*: with petioles 3-6 inches long—foliis paulo longiori petiolo (3-6-pollicari)! Only by substituting for “petiolo” the word “pedunculo” could one make much sense out of Nees’ diagnosis (if his plant was a *Dipteracanthus* and related to *D. ciliosus*) but even then his var. *parviflorus* remains wholly vague. It is not a good basis for the name of a common species with petioles rarely 1 cm. long, and surely it was not *R. Purshiana*.

6. *R. heteromorpha*, sp. nov. (TAB. 847 et 848), planta dimorpha vel plus minusve heteromorpha. CAULIBUS VERNALIBUS 1-3 basi plerumque decumbentibus jam adscendentibus simplicibus vel divergenter ramosis 0.4-4 dm. altis puberulis plus minusve patentem villosa-hirsutis, nodis 3-5 (-10), internodiis 0.5-5 cm. longis; foliis membranaceis obovatis vel ellipticis vel oblanceolatis breviter petiolatis integris vel obscure undulatis plus minusve lineolato-strigillosis supra villosa-strigosis basin versus villosa-ciliatis subtus strigoso-hispidis glabratissive, laminis maturis 1.5-4.5 cm. longis 0.8-2.5 cm. latis; pedunculis perbrevis axillaribus ad 1-3 nodos superiores bracteatis; bracteis oblongis; calycis segmentis lineari-attenuatis vix 1 mm. latis villosa-ciliatis 1.5-2 mm. longis; corollis (rarissime 2) 3-5.5 cm. longis coerulesco-purpureis vel pallide caerulescentibus late infundibuliformibus, tubo cylindrico 1.5-3 cm. longo, fauce obconico supra 1-2 cm. diametro, limbo (expanso) 3-4.5 cm. lato; capsulis glabris 1.1-1.6 cm. longis; retinaculis 6 vel 8. CAULIBUS SEROTINIS decumbentibus vel prostratis elongatis ad 6 dm. longis deinde ramosissimis, floribus in glomerulis axillaribus terminalibusque aggregatis, corollis plerumque clausis clavato-tubulosis cleistogamicis 1-3 cm. longis, vel corollis expansis reductisque; seminibus subrotundis 2.5-3.5 mm. diametro. *R. hybrida* sensu Small, Fl. Se. U. S. 1084 (1903), presumably not Pursh, Fl. Am. Sept. ii. 420 (1814).—Dry sands among pines or palmettos, Keys and Everglades, north to east-central FLORIDA: VOLUSIA CO.: moist pine barrens, near Seville, Aug. 1, 1900, A. H. Curtiss, no. 6701A (US), July 30, 1909, Curtiss, no. 6701, as *R. ciliosa*, var., vernal fl. BREVARD CO.: scrub, south of Eau Gallie, Dec. 1, 1919, Small, Britton & De Winkler, no. 9200 (NY, US), later state, as *R. parviflora*. ST. LUCIE CO.: (formerly included in Brevard Co.): edge of pond, Okeechobee region, April 18, 1903, Fredholm, no. 5808, vernal fl., as *R. ciliosa*, annotated in one herbarium (US) as *R. parviflora*, in another (G) as *R. carolinien-sis*, with an unpublished varietal name); Indian River, Edw. Palmer, no. 348 (Mo), as *R. strepens*. DE SOTO CO.: dry gravelly

soil, below Arcadia, March 14, 1926, *Mary H. Williams* (Phil), as *R. ciliosa*, later annotated with an unpublished specific name. LEE co.: Owanita, March 18, 1907, *Wm. Kellogg*, vernal fl., as *R. ciliosa*, later annotated as undescribed var. of *R. caroliniensis*; among palmettos, vicinity of Fort Myers, March 21, 1916, *Jeanette P. Standley*, no. 70, vernal fl., as *R. humilis*, later annotated like the last (G) and as *R. parviflora* (US) and as an undescribed species (Phil); in pineland, vicinity of Fort Myers, May 4, 1916, *J. P. Standley*, no. 425, vernal fl. (US), as *R. humilis*, later annotated as *R. parviflora*; in pineland, Mullock Creek District, about 8 miles southeast of Fort Myers, May–June, 1917, *J. P. Standley*, no. 444, vernal fl., as *R. humilis*, annotated (G) as an unpublished var. of *R. caroliniensis*, (Phil) as an unpublished species, and (US) as *R. parviflora*; sandy pine woods along road to Coconut, April 14, 1930, *Moldenke*, no. 968, vernal fl. (Duke, Mo, NY). DADE co.: dry sandy soil among palmettos, Buena Vista, Jan. 17, 1930, *Moldenke*, no. 426 (Duke, Mo, NY), as *R. hybrida*, vernal fl. and fr.; pinelands near Little River, Feb., 1917, *W. E. Safford* (US), as *R. hybrida*, later annotated as *R. parviflora*; Miami, April 4–7, 1898, *Pollard & Collins*, no. 233 (US), as *R. humilis*, later annotated as *R. parviflora*, April 1, 1903, vernal fl., *N. L. Britton* (US), as *R. hybrida*, later annotated as an unpublished var. of *R. caroliniensis*, March 14, 1917, *H. B. Meredith* (Phil), vernal fl., passing to later stage, as *R. ciliosa*, later annotated as an unpublished species; pinelands between Miami and Kendall Station, Nov. 5, 1906, *Small & Carter*, no. 2603 (NY), later stage, as *R. hybrida*, later annotated as unpublished var. of *R. caroliniensis*; pinelands between Coconut Grove and Cutler, Oct. 31–Nov. 4, 1903, *Small & Carter*, no. 1273 (NY as *R. hybrida*, Phil as *R. parviflora*, the former later annotated as an undescribed species), later stage; pinelands about Sykes Hammock, Everglade Keys, March 15, 1915, *Small, Mosier & Simpson*, no. 5772, as *R. hybrida*, later annotated as an undescribed var. of *R. carolinien-sis*—TYPE of *R. heteromorpha* in Herb. N. Y. Bot. Gard., vernal fl., passing to later stage; pinelands about Goodburn Hammock, Everglade Keys, June 31, 1915. *Small & Mosier*, no. 6381 (NY); pinelands between Cutler and Longview Camp, Nov. 9–12, 1903, *Small & Carter*, no. 1097, later state, labeled and annotated like the last; pinelands between Long Prairie and Camp Longview, Oct. 31, 1906, *Small & Carter*, no. 2695 (NY), later state, labeled and annotated like the last; between Peter's and Long Prairie, Nov., 1906, *J. J. Carter*, no. 173 (Phil), as *R. parviflora*, later annotated as an undescribed species; pinelands about Humbugus Prairie, Feb. 28, 1915, *Small & Mosier*, no. 5555 (NY), later state, as *R. hybrida*, later annotated as a var. of *R. caroliniensis*; pinelands between Peter's Prairie and Homestead, Nov. 10,

1906, *Small & Carter*, no. 2701 (NY), later state, named as the last; pinelands about Ross-Costello Hammock, Everglades Keys, June 24, 1915, *Small, Mosier & Small*, nò. 6552, later state, as *R. hybrida*. MONROE CO.: woods, Pine Key, *Blodgett*, later state; pinelands, Big Pine Key, May 1, 1917, *Small*, no. 8142, vernal fl., as *R. humilis*. MAP 5.

Although most often, following Small, identified as *Ruellia hybrida* Pursh, it can hardly be overlooked that *R. heteromorpha* is a species of southern Florida, most abundant in the subtropical Everglades and Keys regions, that its branches, as soon as developed, trail and greatly elongate, that the lower surfaces of its petioled leaves are glabrescent or nearly glabrous from the first (except for lineolate cystoliths and closely appressed strigae) while the upper surfaces are strigose, and that the tube of its fully expanded corolla is usually twice as long as the calyx-segments. *R. hybrida*, from Savannah, Georgia, was described as *erect and very much branched, hirsute with white hairs; the subsessile oblong leaves densely hirsute; the calyx-segments scarcely shorter than the corolla-tube*. That is not a good diagnosis of the present species. Furthermore, Savannah is about 180 miles (a significant distance) north of the northernmost known station for *R. heteromorpha*; and it is surely significant that Nees in DC. Prodr. xi. 123 (1847), indicating by a mark of affirmation that he had seen the Pursh material, cited as belonging with it Drummond's nos. 258 and 259, both of which belong in the essentially sessile- and oblong-leaved copiously white-villous-hirsute plant which Nuttall described from Arkansas as *R. humilis*, a species, moreover, which is unknown in eastern Georgia. Nevertheless, one can hardly pass by this identification by Nees, especially since the description of *R. hybrida* does not closely suggest *R. heteromorpha*. In view of his lack of material and his "lumping" of many different American plants as so-called varieties of his all-inclusive *Dipteracanthus ciliatus*, one can hardly accept the identification of Nees as final. Similarly, *R. ciliosa* Pursh, originally described as with subsessile, ovate-oblong leaves with margins and veins long-ciliate with white hairs, and also from Savannah, was by Nees, who evidently saw the original material, matched with the broader-leaved and longer-flowered extreme of the species which Nuttall described as *R. humilis*. Several of the numbers cited by Nees are before me. They are uniform and



Photo. B. G. Schubert.

RUELLIA HETEROMORPHA, later cleistogamous stage: FIG. 1, portion of long fruiting branch, $\times 1$; FIGS. 2 and 3, branchlets, $\times \frac{1}{2}$; FIG. 4, tip of branchlet, with two cleistogamous flowers, $\times 1$; FIG. 5, calyces and capsules, $\times 2$.



Photo. B. G. Schubert.

RUELLIA CILIOSA: FIGS. 1-3, plants, $\times 1$; FIG. 4, summit of internode and base of cauline leaf, $\times 4$; FIG. 5, calyx and capsule, $\times 2$.

have nothing to do except generically with *R. heteromorpha* nor with any plant known from the Savannah region; *R. parviflora*, as already sufficiently emphasized (see p. 2), was a misbegotten name for some plant (surely not the present) with "petioles 3–6 inches long"; while *R. caroliniensis* goes back to Walter's remarkably clear description of a plant extending hundreds of miles north of *R. heteromorpha*, with distinctive characters which do not belong to the latter: ovate-lanceolate and hirsute leaves; throat of corolla campanulate, etc. When many of the specimens were annotated by an earlier student as an unpublished new species, they were given a name previously used by Nuttall for a quite different species (with rosettes of spatulate leaves, the plant I take to be Pursh's *R. ciliosa*, the *R. humilis* sensu Small, not Nutt.), but identical material of the same numbers was likewise annotated with 2 or more additional names. Under these circumstances it seems wiser to avoid publishing names so vaguely understood by their author and to start anew.

In its vernal showily flowering state, with simple or subsimple, erect stems (PLATE 847, FIGS. 1–3) *Ruellia heteromorpha* is so unlike the later state of the plant (PLATE 848, FIGS. 1–3), with trailing and elongate heavily fruiting and freely branching stems, and with smaller or even closed and cleistogamous flowers, that the two might be mistaken for two species. Transitions between the two states are, however, very numerous.

7. *R. CILIOSA* Pursh. Rosulate copiously villous plant, either with main axis abbreviated (0.5–5 cm. long) or elongated to 3 dm. high, the internodes copiously white-villous, the pairs of leaves in the abbreviated plants crowded, in the more open and elongate individuals the 2–5 pairs remote, the stem often divergently branched, especially at base: lower subrosulate leaves oblong, oblong-obovate or oblong-ob lanceolate to lance-spatulate, prolonged to subsessile bases, obtuse to rounded at summit, copiously lineolate and more or less villous-hirsute, the larger ones 2–10 cm. long and 1–3 cm. broad; the median leaves often much longer; the upper reduced and often crowded, both median and upper more definitely petioled, their margins often undulate: flowers mostly solitary in the axils, short-peduncled, the heavily villous peduncle terminated by 2 small oblong to lanceolate bracts: calyx-segments linear-acicular, copiously villous, 1.5–2.5 cm. long; corolla bluish or lavender to nearly white, 2.5–5.5 cm. long; the slender tube 1.3–3 cm. long, the slenderly obconic throat 5–10 mm. in diameter at summit, the expanded limb

2.5–5 cm. broad; capsule 1.3–2 cm. long, glabrous; retinacula 6 or 8; seeds suborbicular, about 3 mm. in diameter.—Fl. Am. Sept. ii. 420 (1814), not most later auth. *Dipteracanthus ciliatus* (Pursh) Nees in Linnæa, xvi. 204 (1842), not in DC. Prodr. xi. 122 (1847), which was a hopeless mixture. *R. humilis* sensu Small, Fl. Se. U. S. 1084 (1903), not Nutt.—Dry pine barrens and sands, South Carolina to central Florida and southeastern Louisiana. SOUTH CAROLINA: WITHOUT STATED LOCALITY: "Hab. in Carolina", *H. M. Altorp* (Mo). DARLINGTON CO.: sandy soil in Sheep Pasture Savannah at Hartsville, *B. E. Smith*, no. 1651 (NC), dwarf state, as *R. humilis*; sandy soil between Darlington and Hartsville, *B. E. Smith*, no. 916 (NC), tall state, as *R. hybrida* Pursh. SUMTER CO.: pine barrens near Cane Savannah, *Witmer Stone*, no. 426 (Phil), as *R. humilis*. GEORGIA: WITHOUT STATED LOCALITY: *Nuttall*, as an unpublished new species (Phil); *Boykin* (Phil). CAMDEN CO.: lowland, *Grace J. Schallert*, no. 13,127 (Schallert). CHARLESTON CO.: "Extreme drought conditions", Gopher Ridge (sandy), near Sterling Branch, *Jean Sherwood Harper*, no. 419 (Phil), as *R. humilis*. WORTH CO.: vicinity of Poulan, *Pollard & Maxon*, no. 574, as *R. humilis*, later annotated (G) correctly as *R. ciliosa*. MITCHELL CO.: Camilla, *S. M. Tracy*, no. 3532 (Mo), as *R. strepens*. FLORIDA: DUVAL CO.: dry pine barrens, *A. H. Curtiss*, no. 1944*, as an unpublished var. of *R. strepens*, in some herbaria altered to *R. ciliosa*, in others to *R. humilis*; Jacksonville, 1875, *A. H. Curtiss* (US), correctly as *R. ciliosa*, annotated as *R. humilis*; dry pine barrens, *Fredholm*, no. 5085, as *R. ciliosa*, var. *longiflora* Gray. ST. JOHNS CO.: near St. Augustine, June, 1883, *T. F. Seal* (Phil). ORANGE CO.: sand, Winter Park, April, 1900, *A. M. Huger* (NY), as *R. humilis*; sandy pine barren, Lake Brantley, *C. S. Williamson* (NY), as *R. strepens*, altered to *R. humilis*; Clarcona, 1899, *A. J. Pieters*, no. 120 (US). LAKE CO.: Okahumpha, March 5, 1888, *Isaac Burk* (Phil); vicinity of Eustis, *Nash*, no. 183. HERNANDO CO.: dry sandy woods, Brookeville, *Moldenke*, no. 5948 (NY). PASCO CO.: high pineland, Blanton, *Barnhart*, no. 2653 (US), as *R. humilis*. HILLSBORO CO.: Tampa, June–Aug., 1898, *A. M. Ferguson* (Mo). MARION CO.: turkey-oak woods, east of Citra, April 14, 1940, *W. A. Merrill* (Mo), as *R. humilis*. ALACHUA CO.: Gainesville, *G. S. Miller*, no. 437 (US) as *R. humilis*; scrub west of Carroll's, near Gainesville, May 28, 1936, *W. A. Merrill* (Mo), as *R. humilis*. SUWANEE CO.: Live Oak, *S. M. Tracy*, no. 6684 (NY), as *R. humilis*. GADSDEN CO.: in pinetis, prope Quincy, Mai–Jul. 1843, *Rugel* (NY), as *R. strepens*; grassy, white sandy dry field under pine, River Junction, *Wiegand & Manning* no. 2927, as *R. humilis*. LIBERTY CO.: Bristol, *Chapman* (Mo, US). CALHOUN CO.: Wewahitchka, *Chapman* (Mo). HOLMES CO.: Ponce de Leon, June 20, 1905, *J. M. Mac-*

farlane (Pa). WALTON CO.: dry open woods, Crestview, A. H. Curtiss, no. 6489, in part, as *R. humilis*. OKALOOSA CO.: near Camp Pinchot, June 21, 1928, O. M. Freeman (USNA), as *R. humilis*. ALABAMA: WITHOUT STATED LOCALITY: *R. Haines*, from Gates (Phil). CHILTON CO.: Clauton, Pollard & Maxon, no. 273 (US), as *R. humilis*. ELMORE CO.: Deatsville, Pollard & Maxon, no. 305 (US), as *R. humilis*. WASHINGTON CO.: Fruitdale, July, 1904, So. Floral Nursery Co. (Mo), as *R. humilis*. BALDWIN CO.: dry woods, Magnolia Springs, June 25, 1909, Schallert (Duke); dry open woods, Point Clear, 1896, Mohr (US); dry pine barrens about ½ mile west of Elberta, R. M. Harper, no. 3795. MOBILE CO.: dry pine woods, Mobile, July, 1877, Mohr (US); pine barrens, Spring Hill, E. W. Graves, no. 498 (? or 948), in part only (Mo, US), as *R. humilis*. MISSISSIPPI: JASPER CO.: Heidelberg, Tracy, no. 3324 (US), as *R. humilis*. WAYNE CO.: Waynesboro, Pollard, no. 1221 (Mo, NY, US), as *R. humilis*. HARRISON CO.: Beauvoir, S. M. Tracy, no. 4942 (US), as *R. humilis*; Biloxi, Tracy, no. 6433 (US), as *R. parviflora*, altered to *R. humilis*; Ocean Springs, A. B. Seymour, no. 153, as *R. humilis*, var. *longiflora*. LOUISIANA: ORLEANS PARISH: New Orleans, Drummond. POINTE COUPÉE PARISH: dry sandy soil, Red River, Hale. PLATES 849 and 850; MAP 6.

Among the very diverse plants which have been identified with *Ruellia ciliosa* Pursh the present species seems to me most likely to be what he had from Savannah. His description, emphasizing the sessile ovate-oblong leaves (remembering that Pursh used "ovate" for truly ovate and for *obovate* outlines) with long white ciliation, the bracts lanceolate, the subulate calyx-segments one fourth the length of the corolla-tube, was better for this plant than for most of the species (with ovate or lanceolate and petioled leaves) to which the name has been applied. Pursh's account was as follows

ciliosa. 4. *R. erecta, ramosa; foliis sessilibus ovato-oblongis margine nervis venisque pilis albis longe ciliatis, bracteis lanceolatis brevibus, calycis laciniis subulatis tubo corollae quadruplo brevioribus.*

Near Savannah, Georgia. 24. July. *v.s. in Herb. Enslen.*

Since this is the only plant which approximately satisfies the diagnosis and since it extends northward across South Carolina, I am retaining the name *Ruellia ciliosa* for it. When the actual type can be examined some revision may be necessitated. In DeCandolle, Prodr. xi. 122 (1847) Nees introduced a confusion

which has lasted for nearly a century, by citing under *Dipteracanthus ciliosus* a number of *Drummond* and other specimens, from Texas to Missouri, which belong to the wholly different *R. humilis* Nutt. The latter, of which a type or isotype is before me, is a definite and wide-ranging inland species, quite unknown on the Atlantic slope of South Carolina and Georgia, with essentially sessile, oblong, ovate or lanceolate leaves with none of the subspatulate or obovate tendency of *R. ciliosa* and never, so far as I have seen, with the slightest rosulate tendency. The type of *R. humilis* was from Arkansas. Nevertheless, Small, clearly describing as *R. humilis* only the dwarfer plants of *R. ciliosa*, gave it, as *R. humilis*, the range: "Georgia and Florida to Mississippi", thus excluding the type-region. By Small's account, his "*R. humilis*" had the "Stems very short, 1-3 cm. long". The majority of collections show some individuals with stems 0.3-3 dm. high, many of them from Florida; I cannot make out how Small disposed of them, for their leaf-outline and extreme villosity keep them out of his other categories.

(To be continued)

CAREX CRISTATELLA IN NEW HAMPSHIRE.—A few hundred yards from where I live in Durham is a swale through which a small brook flows, an area which for a considerable number of years, at least, has been unmowed. Having passed by this relatively unspoiled area often while on my way to work, I finally decided to investigate it. Amongst the abundant *Carices* there, one species in particular, bearing spikes of globose to subglobose and very conspicuous heads on sturdy culms, quickly attracted my attention. It proved to be *Carex cristatella* Britton.

Maackenzie¹ gives its distribution as "swampy meadows and thickets, eastern Massachusetts to North Dakota and southward to Virginia and Missouri", though immediately after he states "(Specimens examined from Quebec, Vermont, . . .)".

In New England, north of Connecticut and Rhode Island, *Carex cristatella* seems to be common only in the western parts of Massachusetts and Vermont. Outlying stations in Massachusetts noted in the Gray Herbarium are at Wilbraham Moun-

¹ North American Flora, Volume 18, p. 167, December 1931.

tain, *F. C. Seymour* No. 644, and at Framingham, July 16, 1905, *F. F. Forbes*, the latter place some sixty miles southwest of Durham. The nearest this species approaches us in Vermont seems to be Danville, which is nearly a hundred miles to the northwest.

The Durham collection, *A. R. Hodgdon* No. 4122, has been placed in the Gray Herbarium as well as the Herbaria of the New England Botanical Club and the University of New Hampshire.—*A. R. HODGDON*, University of New Hampshire, Durham, New Hampshire.

EUPHRASIA CANADENSIS IN MASSACHUSETTS.—While working over the lower eastern slopes of Mt. Greylock on August 11 and 12, 1944, I found *Euphrasia canadensis* at three stations in the town of Adams. The first was in wet land by the roadside between Hoxie Brook and the Theil Farm, which is now a part of the State Reservation. A second station, about a mile and a half from the first, was in dry grassy pasture-land at the top of a bank by the upper road leading southward from Peck's Brook toward Cheshire Harbor; here the plant was in considerable abundance. A few others were noticed at a third station, on a cut by the roadside on Fiske Street, nearer the village of Adams.

Prof. Fernald writes me that these are the first specimens of this plant he has seen from south of the Maine coast or the White Mountain region.

Material from the second station has been deposited in the Gray Herbarium and in the Herbarium of Massachusetts State College.—*ARTHUR K. HARRISON*, Massachusetts State College, Amherst.

VEGETATIVE REPRODUCTION IN *CAREX TRIBULOIDES* AND *C. PROJECTA*.—In an interesting little article on sympodial and monopodial growth in American *Carices*¹, Theodor Holm remarks incidentally that the vegetative shoots of *Carex tribuloides* sometimes develop small axillary buds, "which, however, die off at the same time as the entire shoot itself." The last observation is by no means always correct; both in *C. tribuloides* and its near

¹ Amer. Journ. Sci. ser. 4, i. 348-350, pl. 9 (1896).

relative, *C. projecta*, the buds may become an effective means of vegetative propagation.

My attention was drawn to the matter while collecting, last summer, on the island of Grand Manan in Charlotte County, New Brunswick. In moist, well shaded ground along a brook I ran across a luxuriant clump of *C. projecta*. On the damp soil about its base lay prostrate culms of the previous season, their original blades and sheaths withered and brown, but with slender young shoots up to 5 cm. long arising from just such buds as Holm described and already beginning to take root. Obviously there were here the makings of new individuals, and since the leafy culms may reach a height of 4–5 dm. they would, if they fell outward, carry the young plants beyond the range of fatal competition with the parent rhizome.

The buds develop at the very base of the old sheaths—i. e. at the nodes—and inside them. They produce four or five short, stiff, veiny blades which apparently function as bud-scales. With their protection, the buds live independently over winter; the old culms are flaccid and seemingly dead to the very base and to all appearance could furnish no nutriment. The new shoots soon force their way out of the sheaths; but if the sheath below the point of origin of the bud is not thoroughly decomposed, the first root may grow down inside it to a distance of 2 cm. In the Grand Manan specimen, the roots also had made their way out and into the soil.

Three sheets of *C. tribuloides* and 10 of *C. projecta* in the Gray Herbarium show sprouting buds in more or less advanced stages. There would probably be more if collectors had less often been contented to snatch a culm or two and leave the rest of the plant behind. It would seem that someone must have noticed a phenomenon so far from rare, but I find no mention of it in the literature at hand.—C. A. WEATHERBY.

Volume 46, no. 552, including pages 453–516 and title-page of volume, was issued 16 December, 1944.



Photo. B. G. Schubert.

RUELLIA CILIOSA: FIG. 1, plant, $\times 1$; FIG. 2, basal branch, $\times 1$; FIG. 3, large-flowered branch, $\times 1$.

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